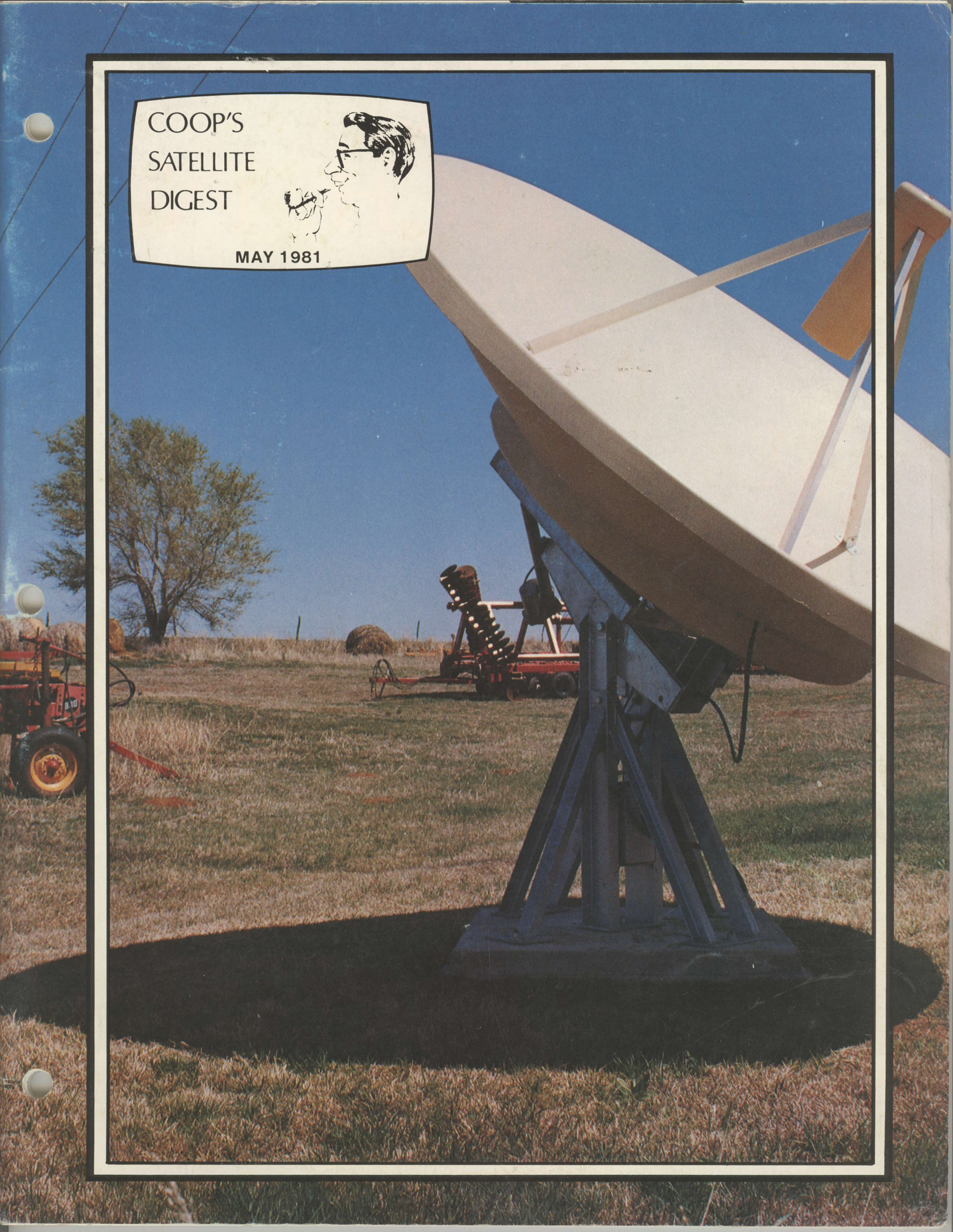
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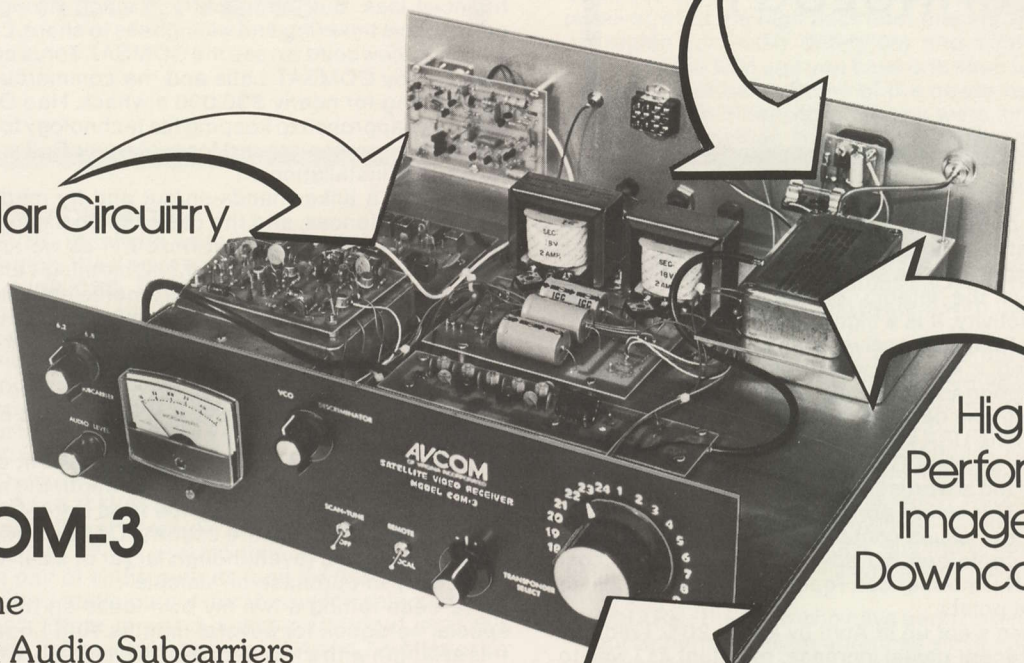

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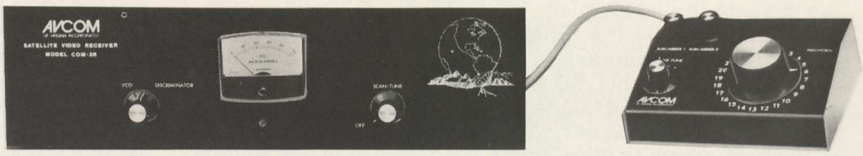

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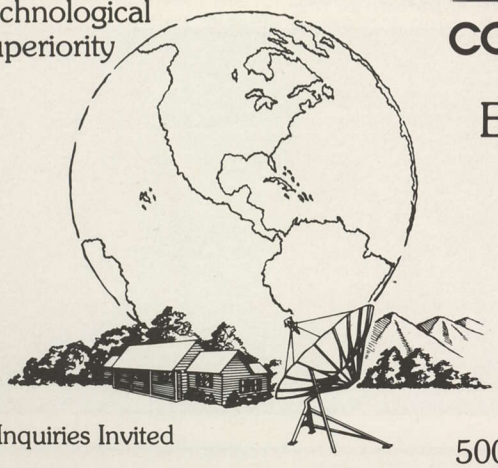

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COOP'S COMMENT ON TECHNOLOGY

THE PRICE WE PAY...

The first issue of **CSD** was back in October 1979. That doesn't seem that long ago, but when you measure the time span by the number of new satellite related business ventures launched in the interim, or the number of people involved in this activity, it is a significant period of time.

CSD was to be a "comprehensive newsletter". That's why we started off mailing it via **first class** mail, to insure timely delivery of the important facts and information each issue would contain. In those days we placed 67 cents postage on each issue inside the USA and for those going to the furthest mail points (such as New Guinea) around $3.00. The first issue had around ten advertisers and we began with just over 500 subscribers. The recent April issue contained 52 pages; plus the cover. Early issues contained 32 pages. The recent April issue also contained 50 advertisements and it cost $1.20 to mail to North American readers; up to $7.00 (!!!) to New Guinea type points.

Advertising rates went up in April by about 20%. I did this anticipating the recent postal increase; reluctant as I was to increase the annual subscription rate of $50 US ($75 foreign), deciding that by raising the rates for advertising we could cover the 20% postal increase.

Now some might suspect that with 50 advertisements **CSD** is raking in the cash. I wish that were the case. In the same period since October 1979 **basic** printing costs have gone up by 39%. With 52 pages versus 32 pages, a 20% postal increase, increased basic costs for printing, mailing envelopes and labor...we are ending up with spare money to plow **back into** editorial research and costs almost to the dollar as we did with the first issue!

At the same time the 'tone' of **CSD** has changed to reflect the tremendous increase in dealer/distributor/new product activity. Most present **CSD** readers are not **that interested** in GaAs-FET amplifier designs but they are interested in what works good (and does not work good), and, the **simple** basics of the technology. In other words, we have a high percentage of readers who want to stay current, know enough about the technology to be a step ahead of their customers...but no more than that.

I view this with mixed emotions. We need a strong dealer/distributor base certainly. We also need a strong hands-on technical base made up of people who like to tinker, experiment, and attempt to make equipment work better. Oliver Swan, who 'invented' the low-cost TVRO spherical (for example) developed this now-important technology because he had a curious mind. No amount of corporate funding or research could have created the low-cost spherical for us as an industry. Oliver shared willingly, perhaps to his own financial loss. But the industry is much stronger today because of his tinkering and willingness to share. Looking at the opposite viewpoint we see the COMSAT Torus antenna being licensed by COMSAT Labs and the commercial versions of same going for nearly $30,000 a whack. Had Oliver had the COMSAT approach to keeping his technology to himself we'd still be scrounging around for military or Bell surplus dishes for 'cheap' installations.

We need a tinker/hands-on/cut and try medium to share ideas, experiences, and the basics of an exploding industry. **CSD** offers the medium but boxed in as we are with a first class mail delivery commitment (something I am unwilling to change since second class is very inefficient) and the need to keep **CSD** small enough that it can be 'closed up' one week and mailed the next, it is not the right vehicle to get us where we need to be. The satellite industry also needs more exposure; a better opportunity for new blood to find out what we are doing and get involved. It also needs more room to share and exchange ideas.

It appears we need a second publication; one designed from the beginning to cover in great depth the subject areas **CSD** cannot cover. One designed to be in front of new people on newsstands across the country. One designed to be less costly to produce (even though larger in size) and therefore less costly to purchase or "sample".

I've been jotting down my own ideas on this subject in a special notebook for several months. And I have discussed this at length with a few people in this industry who have good insight to what is happening today and is likely to happen tomorrow. Out of all of this has come a plan and a concept for a new magazine. But I am not ready to announce it quite yet. What I am ready to do is to talk about it, quietly and seriously, with those who might have some contributions to make in the form of publish-able material. I don't intend to write this new publication myself each month, as I now largely do for **CSD**. To insure that new ideas have a forum for presentation, we want to encourage lively reader/industry participation from the outset. If we don't start sharing again we are going to end up like COMSAT and others who mistakenly believe that technology only advances under their own roof and the work of others is seldom if ever formally acknowledged.

Let me hear from you. Confidentially of course. Even if you feel you cannot contribute to such a forum, your thoughts on what you would like to see included in a new publication such as this are important to me.

CSD TECHNOLOGY

COOP'S SATELLITE DIGEST (Technology Section) is published monthly by Robert B. and Susan T. Cooper doing business as Satellite Television Technology (STT). Editorial offices located at West Indies Video, Grace Bay, Providenciales, Turks & Caicos, BWI. Communication with editorial office is through Business Office at P.O. Box G, Arcadia, OK 73007 (405-396-2574); Rick Schneringer, Manager. Photography, Kevin Paul Cooper; editorial assistance Tasha Anne Cooper. STT produces various manuals, videotapes, guides and texts plus conducts the twice annual SPTS and once-annual SBOC events. STT is not affiliated with any manufacturer or distributor of satellite communications equipment. **CSD** subscription $50 per year US / Canada / Mexico; $75 elsewhere.

A BRIEF UPDATE ON RECEIVERS

PROGRESS MARCHES ON

Many new TVRO receivers were scheduled to be shown at SPTS Washington. We'll have a report on what was operating there in the **June CSD**. Prior to SPTS however there were some significant production changes, new models and other interesting receiver wrinkles brought to the **CSD** Lab for evaluation and comment. We thought you would like to know what we found.

ICM - International Crystal Manufacturing Company has brought out a new model; **the 4000.** This looks very similar to the 4300 series although it is a dramatic departure from the 4300. On the front panel you have a two position switch to select 6.2 or 6.8 MHz subcarrier audio. You also have a new (vertical) signal strength meter which gives you a **relative** reading of the system gain. On the back panel there are a pair of audio outputs (one for 6.2, the other for 6.8) plus a third audio output (for the switch selected front panel signal). There is also a subcarrier output jack; this gives you the full spectrum between 5.4 and 7.5 MHz or so. We'll explain that one shortly. A remote control jack is also on the rear panel.

The 4000 is the latest technology from ICM. It has the new divide by two PLL demodulator system and the entire receiver has been re-laid out for ease of manufacture, test, alignment and trouble shooting. An adequate if not over powering four page data sheet gives the technician some assistance on locating what pot or control on the circuit board does what function.

We found the pair of controls that adjust the 35 MHz PLL (divide by two and demod) system out of whack when we got the receiver down here in the islands after a 2,000 mile journey. **It took us 30 seconds to tweek up the picture to peak performance.** How well does it work? There **is** a substantial improvement on most transponders from our previously reviewed 4300. Remember that the 4300 was the most sensitive receiver here for some time, later to be 'tied' in sensitivity by the first Washburn we got down here. Also remember that the Washburn found our favor primarily because of the picture 'quality' or fidelity. **The 4300 makes a dramatic improvement in PLL 'tear'**; that annoying fringing that causes sharp color lines to bleed to the right with white streaking. This effect is **almost** eliminated with the 4000. Almost means we can still see it, **but we no longer find it to be annoying.** We also judge the 4000 we brought down to be slightly (that is subjective, we admit) more sensitive than our trusted 4300; on most channels. But not on all channels. Final in-brief analysis: The 4000 works better than the 4300 we compared it to and the picture quality that one might object to with PLL type demodulators is all but gone. But - you may have to tweek on the appropriate (manual identified) controls to get peak performance of the unit after taking it out of the box.

ICM also has a new accessory box which we found of considerable use. It is their Audio Subcarrier Tuneable Demodulator. By plugging into the subcarrier output jack on the 4000 (or wiring to the subcarrier section inside another receiver, after the high pass filter that separates the 5.4 MHz up region for audio detection) and connecting an audio system to the ICM unit you have one knob tuning through the full subcarrier band. Some of the newer receivers have this built in but for older receivers you were kind of on your own putting it altogether. This is a high quality piece of gear (and not inexpensive; around $190) that is sure to bring out a series of lower priced imitations if there proves to be a market for a stand alone audio demod. You have two input jacks (one type BNC, one RCA) and three output jacks; one mono and a pair for stereo output. The unit detects stereo (a red light on front panel glows) from sources such as WFMT on transponder 3. You drive your audio system with the baseband audio outputs.

Having full tuning range over the full 5.4 to 7.5 or so subcarrier region is very handy. Unfortunately, however, some of the audio subs use a non-standard emphasis system (rather than the 75 microsecond) and you get a slightly tinny effect on these music service channels. This will bother the true audiophile who wants every note to be precisely as it left the Oboe; for most of us it is barely noticeable. **Ultimately perhaps** a front panel switching de-emphasis network to match the range of strange emphasis combinations being used in satellite transmission might have to be added to a unit such as this.

VIDIARK - the folks who have been turning out 8, 10 and 12 foot Spherical design antennas since shortly before SPTS 80 in San Jose have gone into the receiver business. Hayden McCullough got us an advanced prototype unit in mid-March and we brought it back to Providenciales with us. This is a single conversion image reject mixer receiver that is availale in three different formats. The basic receiver guts are the same in all three; the bells and whistles differ from one to another.

Seemingly somebody who designs and builds Spherical TVRO antennas should not be expected to know very much about receivers. Fortunately, Hayden is an exception to this quick 'rule' and his advanced prototype was a delightful performer. Now the first hurdle you have to get over with any single conversion image-reject mixer receiver is the VCO noise/interference problem (see this issue of **CSD** for special report). The Vidiark receiver had around -10 to -12 dBm of VCO output at the antenna input port; certainly not the worst offender we have seen in this area. That aside, to the positive aspects of the unit.

One thing you instantly notice with the image reject mixer scheme is that **when you combine that with a 'passive delay line' type of demodulator** (as AVCOM also does) you have a receiver that tunes **smoothly** without the annoying PLL tearing one finds with 564 demodulator schemes. You tune into and out of a channel with no abrupt changes in picture quality. If the 'gearing' (electrical or mechanical) on the tuning knob is in the proper range the receiver tunes very easily; not with the "don't breathe on it" backlash one learns to live with in many other receivers.

We found the VIDIARK receiver (we had the mid-priced version for test) a sensitive unit with good picture quality. While still in Oklahoma we did an "A" / "V" test between it and an AVCOM which Rick Schneringer has operating at the STT office there. The AVCOM had only a **very slight edge** in picture quality and no advantage we could see in sensitivity.

OUR COVER -

Motorized full orbit belt antenna tracking systems. They are here. And if you sell or distribute terminals, you need to know all about their capabilities and cost. A case history 'story' appears in this issue of **CSD**. Photo courtesy of SATFINDER, Tulsa, Oklahoma.

Since the AVCOM and WASHBURN units always seem to be the standards of comparison we felt that was a pretty strong statement.

After Hayden has had an opportunity to handle his initial orders with production units we will look in greater detail at the design and construction of this new receiver line.

WASHBURN - Those who monitor such things carefully have probably noticed that the current crop of Washburn receivers (more properly known now as **'The Earth Terminals Microwave Receiver'**) have a new "look". The case has been redesigned on the demodulator portion, new meters are in new places and the case is a striking black with silver and blue lettering. So what else is new?

As our February issue review reported Clyde Washburn does not believe in popping out with a new receiver model each time there is a production change. What he does do is continually evaluate both receiver performance and production efficiencies constantly searching for areas where one or both can be improved. There are a number of significant recent changes in that line.

1)The current production models have a new first mixer and second LO of Washburn design. The newer version has a lower noise figure, full temperature compensation from -40 to +60 degrees C and improved production ability. In the production area the alignment process for the demodulator has been changed to reduce black and white sparklie 'shift' during initial receiver warm-up. There has been a change in the clamping circuit (a minor improvement designed primarily to reduce longtime waveform bounce to under 8 IRE units). And, the new downconverter has a user changeable (LNA) DC block which allows you to use a VOM to check the current drain of the LNA, in place of an external jumper (**thanks Clyde!**).

2)All units checked to date have shown a threshold for moving video of 7.0 dB, within +/- 1/10th dB.

We recently added a pair of March production run Earth Terminal receivers to our WIV operation and found both to have virtually identical performance on all transponders. Of some interest to us was that both of the newer units were **ever so slightly better** than our November production first Washburn unit. When you compare the older with either of the newer units we have on hand on identical monitors (using the same TVRO signal source) the eye can detect a noticeable reduction in sparklies.

This final note that will probably only make sense to those scattered few who do not have access to good quality AC mains. We recently converted all of the important WIV and TVRO hardware over to a DC/AC system. We take the locally unstable and unpredictable 115-145 VAC and drive an automatic current regulated battery charger. The 13.8 VDC output of the charger in turn drives a pair of heavy duty 12 volt batteries. And they in turn drive a commercial 250 watt frequency controlled inverter that re-creates a 120 VAC source for us. This source happens to be a **square** wave (60 hertz) rather than a sine wave. Into this special AC system we plug TVRO receivers, our in-house video sync source, our Weather/Message Channel character generator memory, our audio/video switcher and a few other low wattage devices. We did this primarily because we got tired of sitting in front of a keyboard typing (and then re-tying) in messages and commands to the various memory units that run the WIV TV facility each time we had a power failure.

We found that the Washburn/Earth Terminal receivers do not care about the 60 hertz square wave source. To our surprise most of the other units did not either. But - the ICM 4000 simply does not like a square wave AC source and cannot be used on this sytem. If you are out in the sticks where you are creating your own AC with a square wave (frequency controlled we hope!) inverter system, you might keep this in mind.

THE VCO PROBLEM WITH SINGLE CONVERSION RECEIVERS

We may have ourselves in a box. Of our own making. Receivers are the concern.

Someplace between the first Microdyne/Hughes/Microwave Associates/Scientific Atlanta **commercial** grade receivers, and the present family of wide-ranging design philosophy '**private terminal**' receivers we smelled the secret word; cheap(en). It could turn out to be regretable.

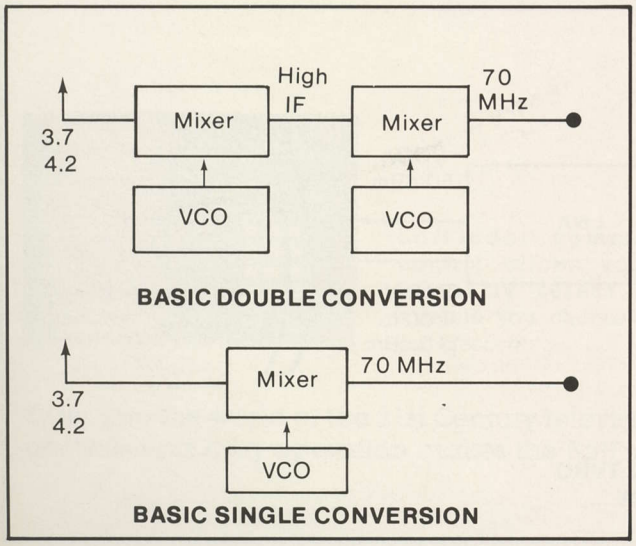
There are two types of receivers commonly employed in private terminal systems. The **double conversion receiver**, which accepts the 3.7 to 4.2 GHz energy and then 'translates' that energy first to a 'high IF' (intermediate frequency - range) in the 800-1200 MHz region, and, the single conversion receiver which goes directly from 3.7-4.2 GHz to the standard 70 MHz range (low) IF in one jump. The double conversion receivers go first to a high IF and then in their second (i.e. double) conversion they drop down to 70 MHz. In both cases it is the 70 MHz IF signal which ends up being demodulated (turned to video).

There are many sound arguments for double conversion.

1) **By starting off at 4 GHz**, dropping first to 800-1200 MHz and then to 70 MHz, the receiver designer is able to 'split' the gain requirements up between the three frequency ranges. Innovative circuit designer H. Paul Shuch preached the advantages of splitting and balancing gain in the three frequency ranges during his 'Mini-Symposium' series at SPTS '79 in Oklahoma and SPTS '80 in Miami. Paul suggested that better performance and more cost effective engineering followed balanced gain.

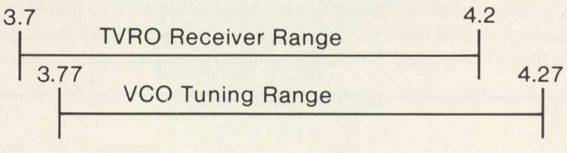
2) **By going from 4 GHz to the higher IF region first,** receiver 'images are reduced or eliminated. And, the inter-action between the tuneable oscillator (the transponder selection knob) and the incoming 3.7 to 4.2 GHz satellite signals is eliminated.

3) **Shuch and others, Taylor Howard included**, also preached that when the day came that receivers might be broken down in to modular parts (i.e. part of the actual receiver **at** the LNA) the double conversion approach gave the build **two options**; leave the LNA at the high IF (say 1200 MHz), or, leave the LNA at 70 MHz.



Most of the good arguments for double conversion are on a relatively high engineering plane. This approach simply offers better control of the received signals, it was argued, and cleaner reproduction of the original satellite uplink baseband information. Arguments for single conversion began for a different reason. First there was the high cost and long lead time of the pair of VCO's (tuned or tuneable oscillators) required for double conversion. One year ago the waiting line was months long for a handful; much longer for substantial quantities. One way to shorten the lead time was to simply reduce the number of VCO's 50%; eliminate one and go the single conversion route. But, as Robert Coleman and other pioneers had shown as early as SPTS '79 single conversion had some severe drawbacks. The biggest apparent **at that time** was the 'image' problem. When you tune a simple single conversion receiver to one channel the "image frequency", often within the 3.7 to 4.2 GHz band and only 1.75 channels away or so, showed up across the dial as a series of 'false signals'. It was not difficult for an afficianado to tell a real signal from an image signal but one could hardly expect a consumer to put up with that garbage.

Then along last June, in **CSD**, Arizona engineer David Barker solved that one by publishing his design notes on a **single conversion image reject mixer** scheme. Barker had adapted technology proven at other frequencies to the TVRO band and with his adaptation he reduced (and almost eliminated) the bothersome 'image'. It was still there but so buried in the noise that no-one would stop to look at it mistaking it for a real signal. Barker proceeded, for a short period, to offer circuit boards and parts, or wired and tested front ends following his design. When he appeared at SPTS '80 in San Jose he was chased by several would be manufacturers who wanted to trade David cash for his rights to the design. Barker settled with KLM and the satellite receiver of the same brand name followed within months.



THE VCO (ON THE 'HIGH SIDE' IN THIS EXAMPLE) TRACKS OR TUNES THROUGH MOST OF THE TVRO BAND.

But there was more to the problem than simply cancelling the image so consumers would not be tricked by the double signals. There was, and is, the matter of the local oscillator (VCO) appearing at the **input** of the receiver (i.e. where the LNA signal plugs in). Remember that with a single conversion receiver operating with a 70 MHz range IF, the one VCO used now tunes through the 3.7 to 4.2 band. It mixes with the incoming signal and the sum (TVRO signal frequency +70 MHz) or the difference (the TVRO frequency) ends up bubbling through the receiver front end.

There are two concerns here. We ran head long into one

of the first at the Houston SBOC where it became apparent that multiple receive antennas plus multiple receiver could not co-exist peacefully all of the time when crammed into close quarters. When the single conversion receiver VCO begins to bubble about the receiver front end some of that signal escapes out of the receiver enclosure. It finds its way to other nearby receivers, antennas and LNAs. It gets there one of several ways.

1)Test completed for **CSD** indicate that the unwanted VCO signal will appear at the input of the receiver (i.e. antenna in jack) in the -15 to 0 dBm region. Those are significant numbers since the typical satellite TVRO signal is arriving at the same jack, going the other way (out to in rather than into out) in the -60 to -50 dBm region. In this case more minus is weaker; the strongest level noted (0 dBm for one receiver VCO/LO measured) and the weakest TVRO signal cited (-60 dBm) are 60 dB apart. The VCO is the winner.

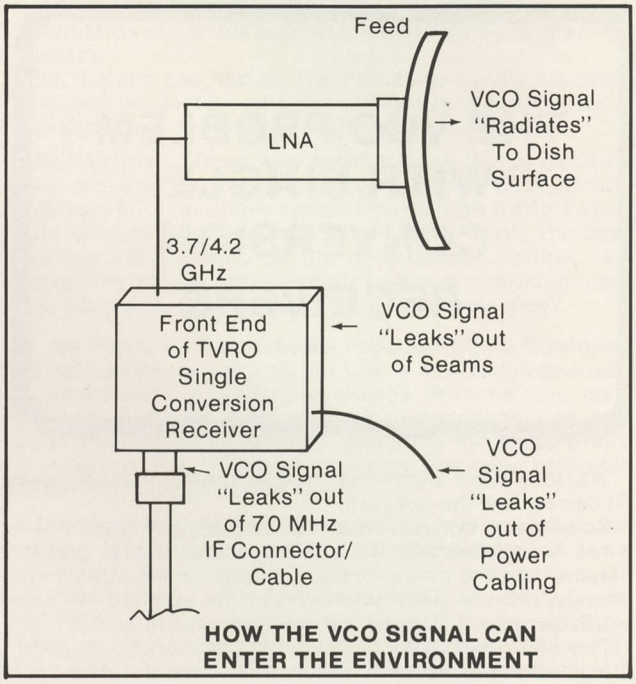
We'll see what might happen with this VCO signal appearing at the receiver input port shortly.

2)**CSD** also looked into the kind of VCO signal levels coming out of other parts of single conversion receivers. We found substantial signals (in the -20 to -30 dBm region) at the VCO frequency at the IF output jack, through cracks in the non-secure metal enclosures and along power wiring inside of (and even outside of) the enclosure.

In one case we found a -20/25 dBm VCO signal crawling along the sheath (outer conductor) of a piece of RG-59/U cable which the manufacturer recommended to be used to couple the 70 MHz receiver IF output to the separate demodulator enclosure.

There was a concern at SPTS '79 that single conversion systems, with the VCO 'running' within the 3.7 to 4.2 GHz band might create interference with other 4 GHz range systems. It could happen in this way. If we take our worst measured example (0 dBm VCO signal in the 3.7 to 4.2 GHz range) and present it to the input N connector on the receiver, we have a signal which if coupled to a ten foot dish is capable of '**transmitting**' an interfering carrier over distances of ten miles or more (in line with the dish). Remember that here on earth we 'share' the 3.7 to 4.2 GHz band with (telephone type) common carrier services. 0 dBm into a ten foot dish ten miles (line of sight) away is not much signal; but it does not take much to create havoc with a terrestrial microwave link.

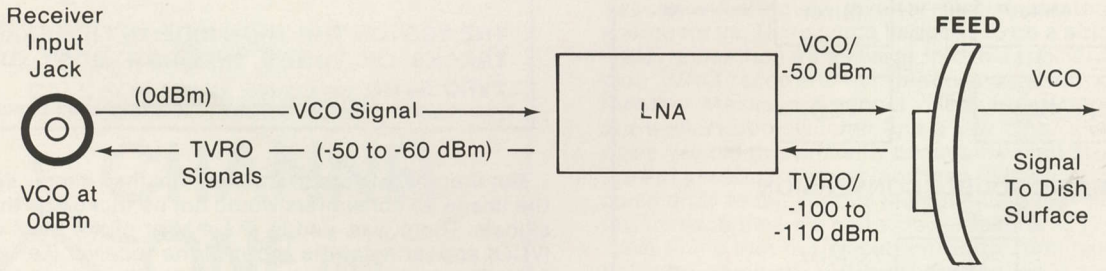
Fortunately for everyone who has purchased a single conversion receiver there is an LNA between the input to the receiver and the dish surface. Otherwise we would have been shut down long ago! The LNA; what does that have to do with things?



HOW THE VCO SIGNAL CAN ENTER THE ENVIRONMENT

The LNA passes 3.7 to 4.2 GHz signals...**in one direction.** From the input port (connected to the feed antenna) to the output port (connecting to the receiver). And our non-desired VCO signal is coming the other way. The LNA helps us here since it has this 'direction of transmission' characteristic. Now most LNAs will attenuate signals that enter the output port (the VCO signal in our case) so that by the time the signal gets to the input port of the LNAs it is 'down' (or weaker) by as much as 50 dB. That is an "as much as" number; it could be lower, even as low as 30 dB. Just how much 'backwards attenuation' the LNA presents to the VCO signal in our example is a function of whether the LNA is built on one, two (or more) boards (more circuit boards mean the backwards path is broken up more often; that helps), how the boards are mounted, what 4 GHz filtering there is in the power leads and so on.

Let's assume the VCO signal is attenuated by 50 dB as it wanders **backwards** thorugh the LNA. It enters it in the -5 dBm region (it could be less or more) and by the time it



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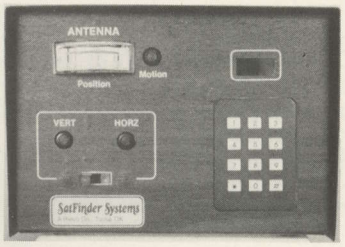

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escapes back into the air through the input port of the LNA it has been attenuated by 50 dB. Add the two together (-5 plus -50) and we have -55 dBm. Guess what that number compares to. The TVRO incoming signal **to the receiver proper**. In other words, even with the attenuation of the LNA (a 'backwards attenuator' of a sort) our VCO signal is launched onto the surface of the receiving dish with almost precisely the same signal level as the LNA amplified signal is simultaneously exiting the output end of the LNA headed for the receiver. This is no longer enough signal power to wipe out a terrestrial microwave link **at ten miles** (assuming line of sight and dead-on pointing) but it is more than enough signal to wipe out any nearby TVRO receiving sites. Such as one finds at an SPTS/SBOC show or as we might expect to find when neighbors start installing antennas in adjacent backyards in the future.

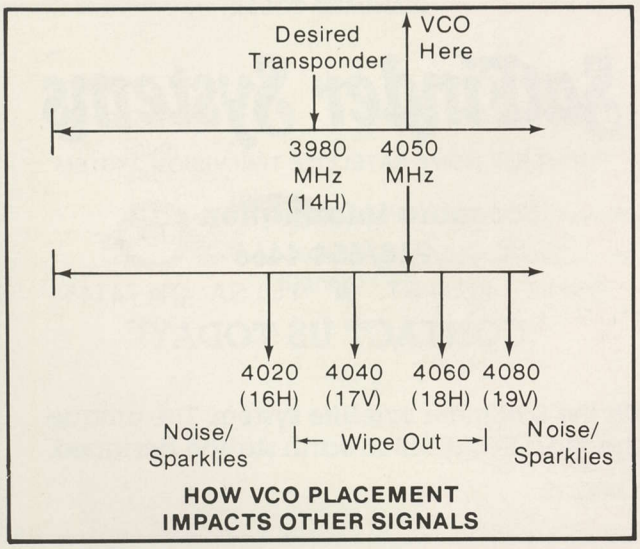
So there is a danger here; a danger created by the VCO operating 'in band' finding its way out of the receiver, onto the antenna surface, and then after being 'amplified' (in directional power) by the parabolic surface, landing on a nearby receiving antenna. In a severe situation the system could still cause interference to a terrestrial microwave link as well.

There is also the problem associated with the in-band VCO being leaked by the metal container of the receiver housing (whether it is an inside or outside unit), or through the connecting cable tying two-piece units together. Cable such as RG-59/U will not carry the 4 GHz VCO leakage signal very far. What happens is that the 'F' type connector, being a non-4 GHz connector, acts like a tiny **antenna**. The sheath of the RG-59/U is not worth much at 4 GHz; in other words VCO signal that is bottled up inside of the container, looking for a chance to escape, finds the output 'F' connector a convenient hole to leak and the sheath on the typical RG-59/U cable a satisfactory transmission medium. Thus we end up with VCO signal spraying about the immediate area in a totally unpredictable fashion. Power wiring, carrying an operating voltage to the upstairs portion of a two-piece unit, acts in a similar manner. It allows the 4 GHz VCO signal out of the box and then it radiates it into the air.

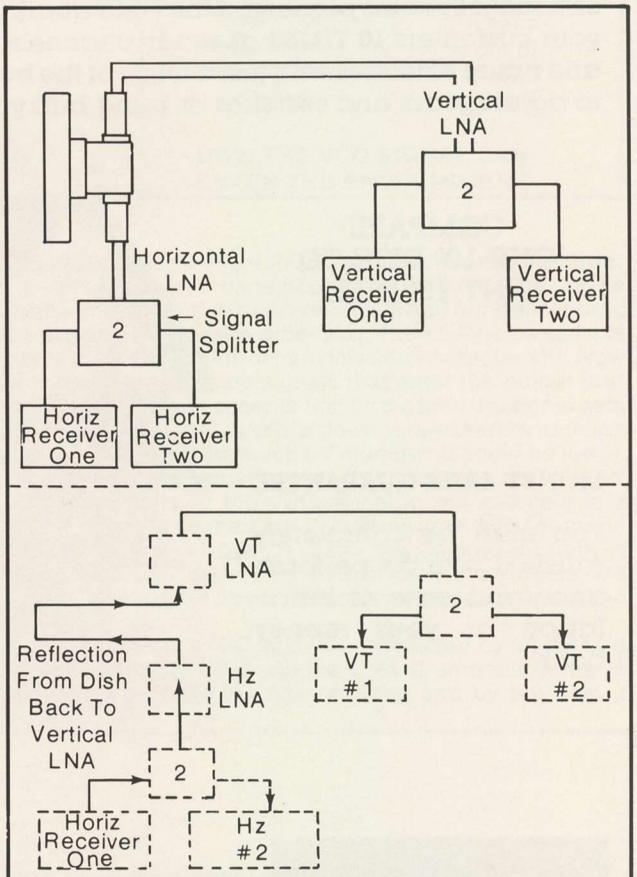
Two Receivers - Same Antenna

Now if you happen to be in an area where your radiating VCO can do no harm to others around you, seemingly the less expensive (and often fine performing) single conversion/ image reject mixer receivers would be a good choice. They are if you understand what the limits are should you ever wish to gang two or more receivers off of the same antenna system.

Recall that the VCO signal runs along 70 MHz removed from the carrier frequency of the incoming signal. At the circuit designers option it could run along +70 MHz or -70 MHz. For example, a signal at 3800 MHz (carrier **minus** 70 MHz) or at 3870 MHz (carrier **plus** 70 MHz). "Which" side of the carrier frequency matters little here; the result is the same. While you have your receiver tuned to 3800 MHz (transponder 5 vertical) your VCO is operating around 3730 MHz. The VCO carrier level is so strong that it literally overpowers any other receivers connected to the same antenna system if they happen to be tuned to signals in the 3700-3750 MHz region (transponders 1, 2). When the antenna system is single polarization (i.e. you must rotate the feed to receive the opposite polarity) the VCO signal will only effect signals on the same polarization (since you cannot look at both simultaneously). With dual-pole feeds and twin LNAs the wandering VCO signal will get into **both** polarizations. When multiple receivers are run off of a single or dual polarized antenna the VCO can get into every other receiver connected to the antenna.



HOW VCO PLACEMENT IMPACTS OTHER SIGNALS



IN THIS SYSTEM HORIZONTAL RECEIVER NUMBER ONE IS A SINGLE CONVERSION. SOLID ARROW/LINE FOLLOWS PATH OF VCO SIGNAL TO OTHER RECEIVERS IN SYSTEM. SPLITTER "ISOLATION" PARTIALLY PROTECTS Hz RECEIVER NUMBER TWO.

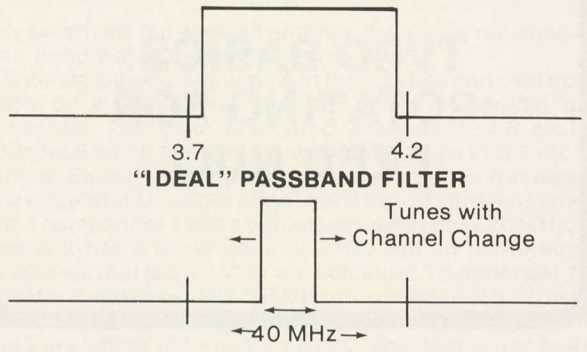
The interference varies in intensity; a function of the VCO level (varies from receiver to receiver), where the single conversion receiver is tuned to and the purity of the 'FM sidebands' of the VCO. When the VCO is typically +/-20 to 25 MHz of the carrier frequency you wish to watch on the second (etc.) receiver, the second receiver simply goes 'blank'; a grey raster caused by the over powering VCO signal. Further off you have FM 'sideband noise'; an increase in sparklies in the

video (starting low and building as you tune the VCO) and then noise in the audio.

Solutions?

One of the oft repeated beliefs is that a 'filter' will cure this problem. There are two types of filters of interest to us here. One is the 3.7 to 4.2 GHz passband filter. The ICM Purifier is an example of this. It allows to pass through any signals falling between 3.7 and 4.2 GHz, but rejects those outside of this band. The other type of filter of interest is a 'tracking filter' that tunes the 3.7 to 4.2 GHz band. This type of filter is designed to pass a single satellite transponder (i.e. 40 MHz wide).

A 3.7 to 4.2 GHz passband filter is not of value to us in this situation since the VCO signal is already "**in**" the band of interest. The tracking is another story; an expensive story at that. In spite of the belief that **recent** image rejection mixers 'discovered' or brought single conversion receivers into the TVRO Marketplace, the truth is that we have had such receivers from the first days of TVRO activity. The Microdyne model 110 TVR(VT) receiver, in the marketplace since 1975, pioneered this approach. But it did so with an elaborate voltage tuned 'tracking filter'. The tracking filter was inserted into the receiver input line and as the receiver was tuned to a particular channel the filter automatically tuned itself to that channel. The input RF connector was thereby protected from the VCO getting back out to the antenna system and other equipment on line.



"IDEAL" TRACKING FILTER PASSES A SINGLE TRANSPONDER TO RECEIVER; REJECTS SIGNALS GOING "EITHER WAY" OUTSIDE OF SINGLE-TRANSPONDER PASSBAND.

Recall that the **key word** in single conversion (private terminal) receivers has been **cheap**(en). Well, tracking filters are **not** cheap. They represent nearly as much complexity and cost as the balance of the whole receiver; even with 1981 technology. They are, therefore, not really a 'design option' available to the receiver system designer. Not in our field at any rate.

The truth of the matter then becomes that when you opt for the pricing advantage of a single conversion-image reject mixer you are accepting the VCO problem as a condition of that approach. You will continue to do so until some bright person comes along with a solution.

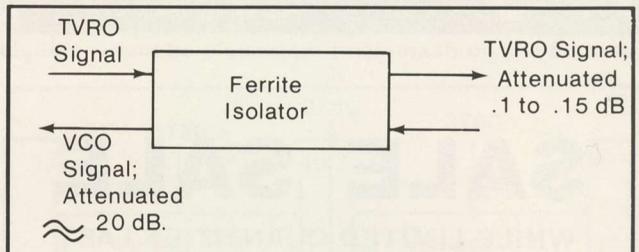
That said, there are things which receiver designers could do to clean up their act. Some of those things are cost effective.

1)**The 3.7-4.2 GHz range VCO signal** can be kept out of the 70 MHz IF line. It is a matter of filtering and 'bypassing'; not a difficult trick, even at 4 GHz. This will eliminate the 70 MHz IF downline from turning into an accidental 'antenna' for the VCO signal.

2)**The VCO signal can also be kept off of** any external power wiring (inter-connecting the antenna unit with the demodulator unit) using similar techniques. Again, filtering and bypassing will do the job.

3)**The container housing the VCO package** can be made 'secure'; bent sheet metal housing with open-air gaps presently serve as 'launching antennas' for VCO signal that is floating around inside of the box. The 'better idea' solution is to bottle up the VCO in a 'leakproof' subcontainer insuring that the signal only exits that container via the proper output coaxial line. More and more of the newer receiver designs place the VCO **out in the open** on a piece of PC board, and that just begs for the VCO signal to wander around. It is like placing a herd of cattle on an open range; without fences, they are going to wander.

What about ferrite isolators? This is a gadget that acts like a one way street to microwave signals. Most **LNAs** have a ferrite isolator in the input line; there to force the LNA to see a constant 'match' to the antenna feed and surface proper. A ferrite isolator attenuates signals traveling one way but not the other. Place one of these (expensive; about $125) devices in the input line to the receiver and the VCO signal trying to get back out through the input RF connector will be attenuated. Alas, the $125 cost is similar in cost effect to going back to a double conversion receiver. And, the ferrite isolator typically only offers around 20 (to 25) dB of reverse direction loss (isolation). If the VCO signal is 0 dBm (as some measured were) knocking it down 20 dB will help but it will hardly cure the problem. The isolation required here is in the 100 dB range to **completely** cure the problem(!).



FERRITE ISOLATOR WOULD HELP, BUT NOT SOLVE, PROBLEM. "REVERSE LOSSES" ARE IN 20dB RANGE, AT ≈ $125 PRICE TAG OEM COST.

Fine Tuning

When you set out to measure the amount of VCO signal present at the TVRO receiver input jack, as **CSD** did, you quickly learn that the amount of signal present varies from (1)transponder to transponder, and, (2)receiver design to receiver design. The variation is not great, in terms of the total amount (100 dB) of attenuation desired here, but it is significant none the less. A receiver that 'puts out' -5 dBm on transponder 12 for example measured a 'range' between -13 and -2 dBm **across the band**. This tells **us** that there are design things the receiver manufacturer **could do** to minimize the VCO leakage level to at least the minimum number measured (-13 dBm in our example).

The incentive to do this is very real. The first step on any journey gets the trip started. As an industry we have a long journey ahead of us in this area and it behooves all receiver suppliers to look at their VCO leakage levels and to do what they can to reduce VCO leakage to the minimum practical amounts possible with their particular designs. If **we** do not do this we can expect to hear from various federal agencies charged with the responsibility of policing our airwaves. In

other words, either **we** clean up our own act or **someone** will come along and **force us** to do it. Remember the fiasco with auto seat belts? It could happen to us as well.

As A User

As a user of TVRO receivers your own awareness of the VCO leakage situation will better equip you to handle customer/user complaints. If you know that a particular customer is not going to put up with interference between receivers you may avoid a great deal of unpleasantness going in by selecting receivers that can be operated without inter-action.

Single conversion image reject mixer receivers have a great deal going for them. Price is one of those pluses. Another is ease of tuning and the typically fixed or passive approach to the demodulator which eliminates your having to tweek on the receiver demodulator controls after receiving the unit. If there are no controls to tweek on, you don't have to worry about something getting out of whack! But with everything that attempts to reduce the final price there is a trade off. Being aware of the trade offs will better equip you to deal with the situation.

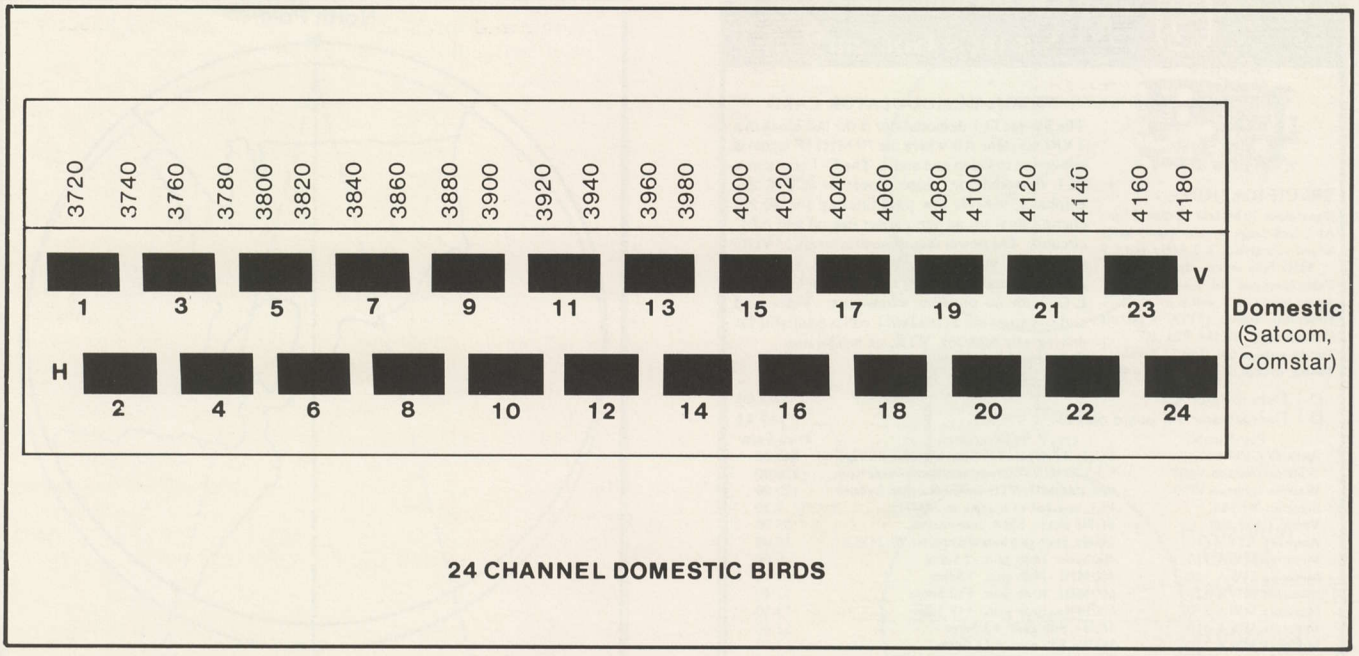
TVRO BASICS: ROTATING FOR FEED NULL

BASIC BACKGROUND

SATCOM birds, COMSTAR birds, and the future series of WESTAR (24 channel) birds do a clever thing. They use and then re-use the same basic 'spectrum' (or channel space). In this way they are able to fill the basic 500 MHz of downlink spectrum with not 12 but 24 separate satellite channels. This is an effective way to get more revenue from their investments, and it is also an effective way to handle the orbit belt since loading up an orbit position with 24 transponders is simply twice as good as doing it with 12. With orbit spots filling up faster than rabbits multiply, this approach meets with government approval.

The 24 channel bird defies the age old adage that two things cannot occupy the same place at the same time. The 500 MHz downlink spectrum (starting at 3.7 GHz or 3700 MHz and extending to 4.2 GHz or 4200 MHz) is wide enough for 12.5 "channels" each 40 MHz wide. The reason for the extra "1/2" channel is simple enough; in addition to the 40 MHz wide transponders the people who operate the bird need some 'space' to conduct control, metering and command functions with the bird. They do this by making space within the spectrum for these extra signals.

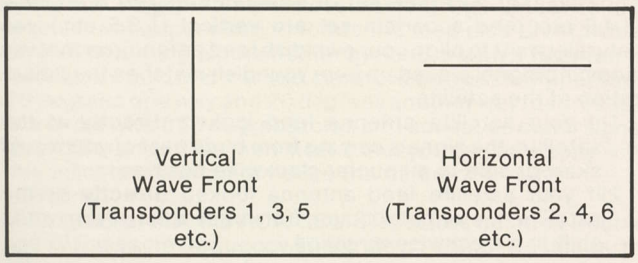
Now how is this wizardy performed? In all types of radio transmissions there is something known as the "sense of pollarization". Take your hand so that fingers point straight up. Your fingers now represent a wave that is "vertically polarized". If you hand were an antenna the signals radiating from your hand would be perpendicular to the earth; or at a right angle to the ground below you. Now bend your hand at your wrist. A full 90 degrees if you can. Your hand is now horizon-



24 CHANNEL DOMESTIC BIRDS

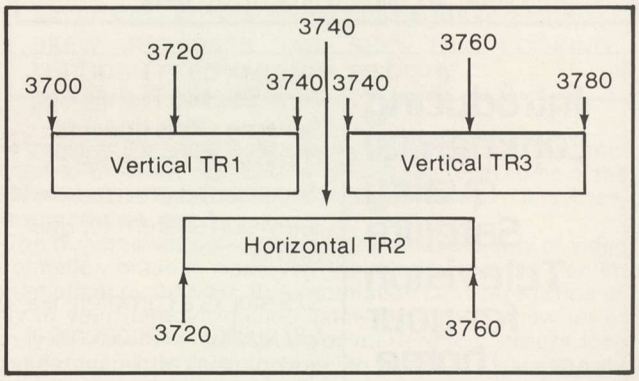
tally polarized. If it were an antenna the waves radiating from your hand would be parallel to the earth.

Satellite signals, originating at the satellite and sent back to earth, on a 24 channel bird are either (1) vertical, or (2) horizontal. The even numbered channels (2,4,6 etc.) are horizontal while the odd numbered channels (1,3,5 etc.) are vertical. Each transponder channel has a 'center frequency', a 'low edge' and an 'upper edge'. Let's look at channels one and two. Transponder 1 has a center frequency of 3720 MHz. That means it has a lower edge of 3700 and an upper edge of 3740. Yes, that is a 40 MHz wide channel. Transponder 2 has a center frequency of 3740 MHz; a lower edge of 3720 and an upper edge of 3760 MHz. You will notice that channels 1 and 2 are 'offset' in frequency by 20 MHz; that is one half of a full transponder width. The same format is followed all the way to channels 23 and 24; transponder 23 has a center frequency of 4160 MHz (lower edge of 4140 and upper edge of 4200). There is a reason for this 'offset'.



Neither RCA nor COMSAT (nor Western Union in the future) want their odd/even signals to interfere with one another. If they placed them exactly at the same frequency (i.e. transponders 1 and 2 for example with a center frequency of 3720 MHz) there is a good chance that they would cause some interference to each other. Even when one is vertical and one is horizontal. By 'offsetting' them 20 MHz they slightly shift on your receiver tuning dial where the horizontal 2 "center tunes" and where the vertical 1 "center tunes". Fortunately for us the FM (frequency modulation) format requires pretty exact "center tuning" of the receiver or we don't fully recover (i.e. receive) the video and accompanying audio baseband information.

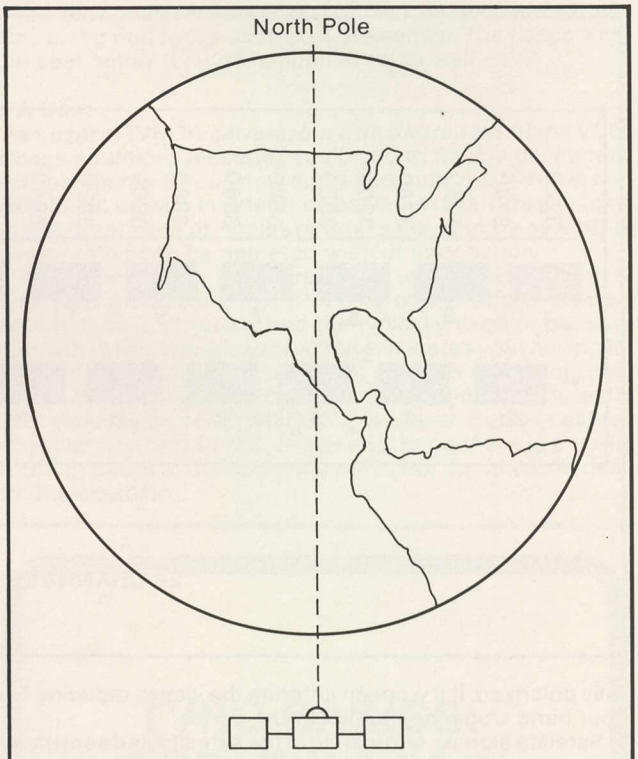
Offsetting alone however would not separate the two sufficiently. But when you combine offsetting with polarization switching, the combination of the two factors adds up to between 45 and 60 dB of "isolation" between the two signals. This solution is important because it makes the 24 channel birds work. Without it, the two signals would be a constant mish-mash on the screen.



On The Bird

All of the vertically polarized transponders are sent back to earth using transmitting antennas that are vertical; all of the horizontals come back through a horizontal transmitting antenna. We'll see how we separate them here on the ground shortly.

Now imagine that you are in space, riding the top of the satellite capsule. Somebody asks you to hold up your hand to indicate vertical, and then horizontal. On earth this is pretty simple; you have the earth's surface to reference to. But at 22,300 miles the earth is a ball out in front of you. So where do you draw your reference? The satellite does it by aligning itself with the north pole. It seeks the north pole and then after radioing back to the earth command center where it "sees" the north pole the command center sends back instructions telling it to turn clockwise or counter clockwise so that some previously assigned 'surface area' (such as the flat top of the bird) is now squarely aligned with the north pole. Having done this the satellite is 'plumb' with the earth. But only with respect to the north pole and **only along that line of**



SATELLITE ADJUSTS ITSELF TO NORTH POLE POINT AS "REFERENCE" FOR HORIZONTAL AND VERTICAL POLARIZATION.

longitude which runs through the satellite to the north pole. For locations on earth east of the satellite's longitude the bird's reference is skewed counter clockwise. For locations west of the satellite's longitude the bird's reference is skewed clockwise.

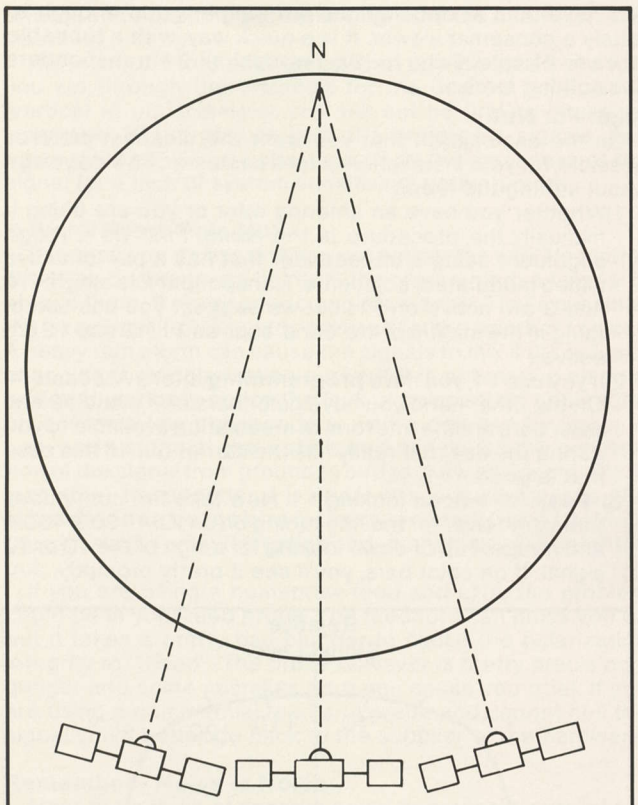
Now let's get back down to earth and your receive terminal. Knowing that a certain set of transponders are horizontal (2,4,6 etc.) and a certain set are vertical (1,3,5 etc.) you naturally want to align your own dish feed antenna so that the incoming signal picked up from your dish matches the polarization of the satellite.

1) If your satellite antenna feed looked **directly** at the satellite, the signals coming from birds east of you would skew or shift in a counter clockwise position.
2) If your satellite feed antenna looked **directly at** the satellite, the signals coming from birds west of you would shift in a clockwise direction.

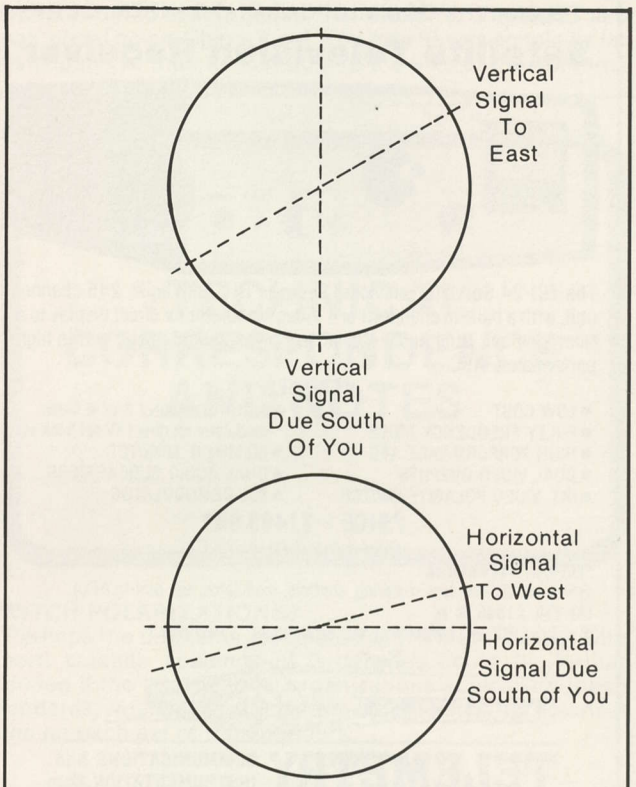
However, your feed antenna does **not** look at the satellite directly; it looks at them through a 'signal mirror'. The **surface** of the dish looks at the signals, and it turns everything around 180 degrees when it focuses the energy backwards towards the satellite and to the feed antenna. Therefore:

3) **Signals east of you are turned around and they shift clockwise.** What was vertical (straight up and down or from 6 to 12 o'clock on the clock face) now shifts towards 11 o'clock/5 o'clock at the feed antenna.
4) **Signals west of you reverse in the opposite direction**; on our clock face towards 1 o'clock / 7 o'clock.

Maximum signal from the dish surface (and the bird) is only obtained when the alignment of your feed antenna and the LNA probe behind the feed antenna directly match the polarization you are trying to receive.



SATELLITES TO EAST OF YOUR LONGITUDE HAVE WAVEFRONTS "SKEWED" COUNTER-CLOCKWISE WHILE SATELLITES TO WEST OF YOUR LONGITUDE SKEW CLOCKWISE.



AFTER REFLECTION FROM DISH SURFACE SIGNAL SKEW REVERSES (AS SEEN BY LOOKING THROUGH FEED ANTENNA TO DISH)

This suggests, rightfully, that to get maximum signal from the bird you need to carefully adjust your feed horn plus LNA on its own axis, clockwise and the counter clockwise, to intercept the maximum signal. This is not as easy as it sounds.

It turns out that the feed horn probe (usually built into the LNA) is really quite insensitive to polarization. If you connected a very precision measurement instrument to the receiver and proceeded to rotate the feed plus LNA (probe) on your mounting pipe (whether by hand or with a TV antenna rotor) you would find that you can move the assembly perhaps 20 degrees one way and 20 degrees another way (degrees as in a circle with 360 degrees total) and not notice much signal level difference. This then means that you can be sloppy with this adjustment and not notice the difference; right?

Wrong.

Remember that the RCA/COMSTAR birds get their double use of the same frequency spectrum by doing two things; by offsetting their center frequency between opposite polarizations by 20 MHz, and, by offsetting the signal polarization by 90 degrees. Also remember that **neither** of these factors **alone** will keep one set of polarized transponders from interfering with the opposite set. It takes the combination of the two to make the system work.

So what happens if you are say 20 degrees off of proper polarization alignment on transponder 2 if the transponder 2 signal level changes very little (if at all)? By being off polarization alignment with transponder two you are also off of 'null' with transponders 1 and 3. Now what does that do, and what is this 'null' business???

A null is a void (sorry about that). It means that something is **minimized**. In this case perfect alignment with the transponder 2 polarization will also be perfect 'null alignment' with the transponder 1 and 3 signals. Null is vital because without it your receiver will start to 'see' (as will your eye) some of the modulation (or baseband information) from (in this case) transponders 1 and 3.

The non-desired polarization signals have plenty of video information present. And even though you may be center-tuned offset by 20 MHz, this information can and will find its way to your detector/demodulator. First it will show up as funny little sparklie-like signals; or interference. Streaks, long dashes, even little dots. You'll say to yourself "**There should not be any** sparklies **in that signal; my receiver signal strength meter shows I have plenty of signal here**". You do. Only some of it is from the opposite polarization transponders. And this unwanted signal, coming into your receiver demodulator from a channel or two not center tuned will look almost precisely like regular weak signal sparklie noise. It takes an experienced eye to tell the difference!

When your feed plus LNA probe is mis-aligned by say 20 (or even 10) degrees this unwanted signal information will degrade your pictures. As the mid-alignment gets worse you can even begin to see a frame bar (the sign of signal sync) floating behind the wanted signal. Then as the mis-alignment increase you can see both sets of video in there (especially with a continuous tuning receiver such as the Washburn or Vidiark where you can 'split the difference' between the two center frequencies). Some people believe they have discovered something new and significant the first time this happens to them. "**I can set my feed plus LNA 'in between' vertical and horizontal and watch both sets of transponders without moving the feed; just by tuning the receiver for center tune on both**" the excited letter to **CSD** writes. Yup, you sure can. Is it marketable? No, of course not.

You have both at once alright, but neither good enough to satisfy a consumer viewer. It is a quick way, with a tuneable receiver of selectivity, to 'zip through' all 24 transponders. But nothing more.

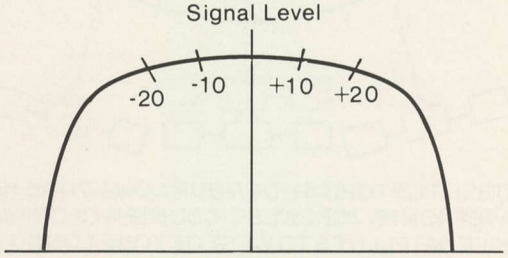
Align For Null

On the assumption that you want the cleanest pictures possible, for your installation or for a customer, how do you go about setting the feed?

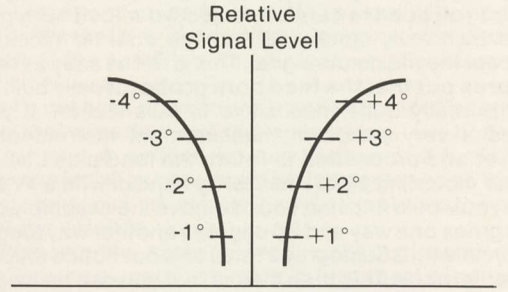
1)Whether you have an antenna rotor or you are doing it manually, the procedure is the same. First do a rough alignment using a transponder that has a pair of active (video modulated) adjacents. Transponder 2 is alright (12 and 3 are active on F1) but we suggest you use something in the middle of the 'band' such as 11 (10 and 12 are active).

2)If you use 11, you have **programming** after 9 AM eastern. On the other hand you have color bars on 10 and 12 and color bars are the one form of modulation available to you during the day that really fills the carrier out. In this case that is good.

3) **Peak** for a good looking 11. Now take the continuous tuning receiver (or the fine tuning on an ICM 4000/4300) and nudge it up or down looking for a sign of the 10 or 12 signal. If on color bars, you'll see it pretty promptly.



THE "PEAK" SIGNAL, WITH PROBE ALIGNMENT, IS VERY BROAD....



...WHILE THE NULL ALIGNMENT IS VERY SHARP.

4)Depending upon how close you are to 'null' you may not get a frame bar; only some increase in noise as you off-center-tune the receiver. If you see a frame bar (or video that can be discerned) from 10 or 12, **peak** the receiver tuning on **that** signal. You'll probably have to look at it 'thorugh' the video modulation still present from 11.

5)Now go back to your feed/probe adjustment. Carefully turn it one way and then the other. Look for the point where all signs of 10 (or 12) **disappear**. What you are doing here is setting the feed/probe to the 'null' (the void) of the undesired cross polarized signal.

When you have the 'null' found, you have achieved something they call "maximum cross-pole isolation." That simply means you have reduced, by adjustment of the feed, the

undesired opposite polarization signal to the minimum level possible.

Having found that position you can now be sure that when you zip through the channels for the desired polarization (vertical in our example) you will not be finding 'noise' or 'sparklies' in the picture from the cross-pole signals. Any noise you see will be noise caused by the weakness of the signal (or a lack of system sensitivity); nothing more.

It Won't Cross-Pole Null...

Suppose you do this and you cannot get the null. No matter what you do, the frame bar from the cross-polarized signal is always there. It never goes completely away. That's possible. If it is raining like crazy, stop and wait for the weather to clear. A heavy rain storm can cause the signals to mix it up; actually changing their polarization purity. If it is not raining on your end, and you **only** notice the lack of polarization separation on one or a few transponders, wait a day and try again. A heavy rain storm at **the uplink end** can cause the polarization of the signal from ground to bird to skew and some of that (example) transponder 11 signal can actually invade **the input antenna on the bird** for transponders 10 and 12. When the rain slacks off at the uplink end, everything will straighten out.

If you are using a homebrew feed and LNA, the problem could be in your feed probe. The feedhorn can mess you up but it takes a pretty bad blunder to cause the polarization integrity to "bleed". The probe however is pretty precision a gadget and some mistakes here can cause you grief. If you are using a commercial feed and probe and cannot null the signal you'd better go back to the supplier of the hardware.

Remember - Noise Is Noise

Most of us think of sparklie noise as a simple case of not enough antenna, not enough LNA, or not enough receiver (or some combination thereof). It may well be. But it could also be a simple case of polarization mis-alignment since FM signals off-center-tuned create noise that looks for the world like weak signal noise. Check it out. You may have a simple fix far less expensive than adding 50% to the size of the antenna!

TECHNICAL CORRESPONDENCE AND NOTES

SWITCH POLARIZATIONS?

Perhaps the problems associated with 3 meter dishes with (short) satellite spacings of 3 degrees could be further reduced if the international organizations controlling these 'standards' would agree that alternate satellites flip polarizations on each set of transponders.

ACH

An interesting suggestion. If birds A and C at say 106 and 112 respectively used the present odd-vertical, even-horizontal format while the birds at 103, 109 and 115 (etc.)

flipped so that odd was horizontal and even was vertical it could make a substantial difference in reduction of interference. We'll pass it on in hopes that somebody does a study on the suggestion.

ANTENNA TEMPERATURE

For some time now I have been confused about something I read (or mis-read) concerning antenna noise temperatures. It would appear that a properly designed antenna looking at the 'cold' night sky (see **figure A**) would have a low noise temperature.

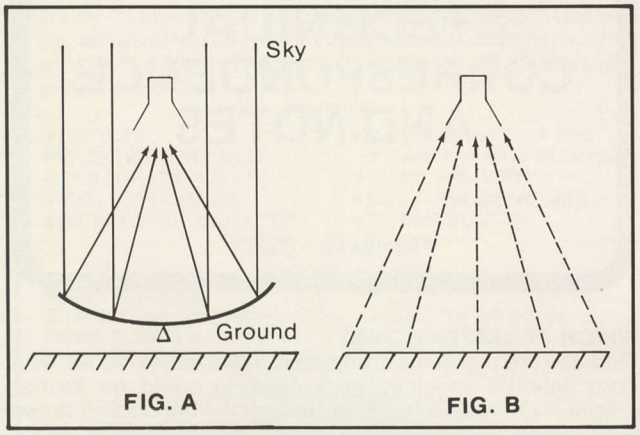


FIG. A **FIG. B**

If the reflector surface was removed, as in **figure B**, the feed horn would 'see' the ground and I have been led to believe that the noise temperature will then be 290K. However is not the surface of the reflector also 290K? Would the system noise temperature not also be 290K even with the reflector in place?

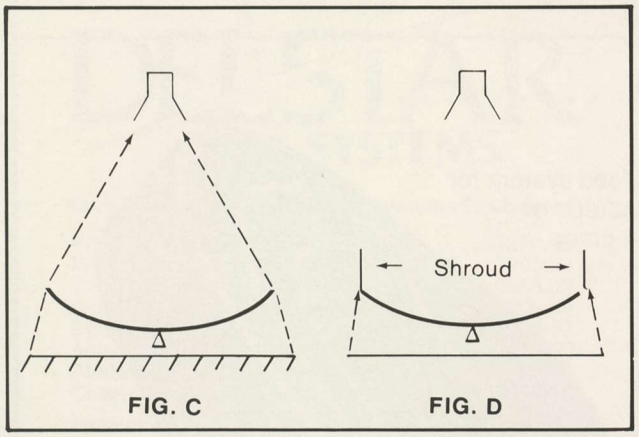


FIG. C **FIG. D**

Why am I asking this question? If the earth's ground surface is the source of noise (here I am ignoring manmade noise sources) then the side lobes of the antenna will pick up noise from the ground as in **figure C**. If I put a shroud around the antenna, as in **figure D**, I should be able to minimize this side lobe pick up. But does not the shroud itself produce similar noise? I assume here that the shroud is a reflector producing noise at 290K also. What would happen if the shroud were constructed from a microwave absorber material?

Norman Scheinberg
182 E. 95th Street, #14D
New York, NY 10028

This is a pretty heavy subject. Earth noise, generally rounded off to 290K, comes from any living **organism because of the molecular motion of the living cells. The trees live, breathe and create noise. The earth surface lives and breathes and creates noise. It was only a few years ago that some scientists from Bell Labs were awarded the Nobel Prize because they discovered that in deep space there is an almost constant background 'noise' in the** 3 degree K **region. This was important because it indicates that spread throughout the universe life is present. Your antenna looking at the cold night sky could detect that 3 degree K noise** if **your receiving equipment had** no noise **of its own. In the TVRO system we have noise from two sources as a rule; earth noise as defined plus electronic noise. The electronic noise is created by the receiver and the LNA** (that's why we set out to have as low noise amplifiers as possible). **They are not living or breathing, but they generate noise none the less because electricity flows and that sets electrons in motion** (or vice versa) **and the motion of the electrons is another form of** 'life' **for molecular structures. The antenna surface, on the other hand, is generally considered to be** dead **since no electricity flows and it does not breathe. All four of your figures are correct; in figure C energy from around the dish does radiate towards the feed** (on a prime focus dish) **but remember the 'patterns' or sidelobe control for the feed is considerably reduced at these far side angles and therefore the 'sensitivity' of the antenna system to the earth noise is typically** 'down' **14 dB or more at this point. Placing a shroud around the dish as illustrated will result in no more than a .1 to .2 dB noise temperature improvement. A better reason for the shroud is to reduce pickup from unwanted** terrestrial signals **that may be bouncing around your area. Unlike the 290K earth, they may be** very **strong and the sidelobe control of the feed may not be adequate to cut them out of the system. The shroud will help in this situation.**

SATELLITE OPERATIONS MANUAL by Bob Cooper reveals innermost secrets of satellite operations, who uses them, how and where. ALSO extensive coverage of simple tricks to improve reception, troubleshoot terminals, maintain high performance, locate special services.

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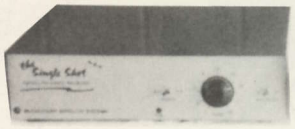

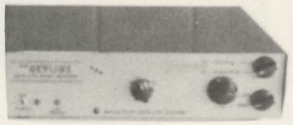

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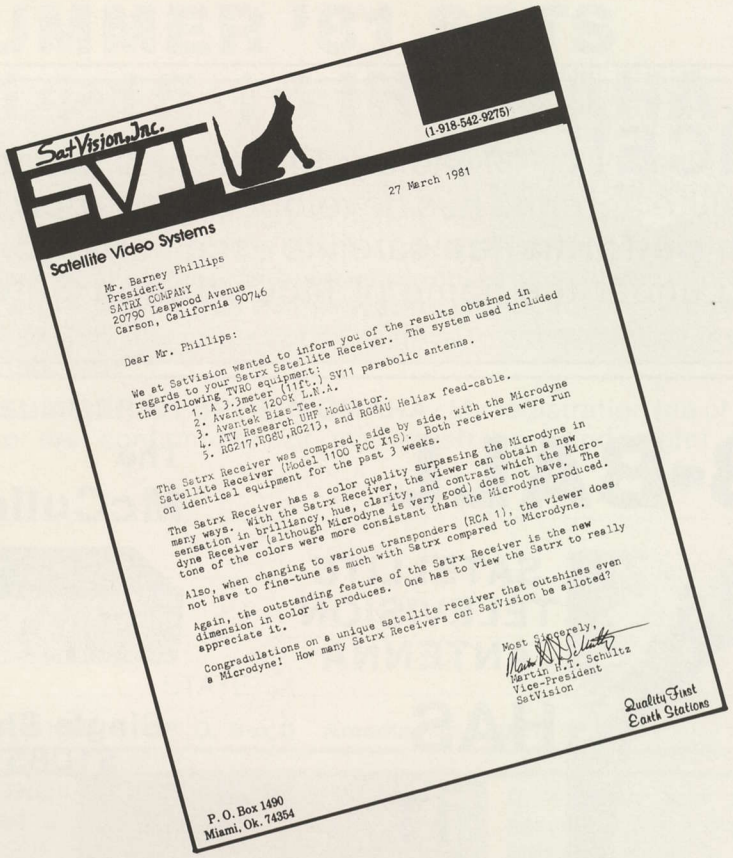
McCullough Satellite Sytems, Inc.

P. O. Box 57 — Salem, Arkansas 72576
Phone: 501-8985-3167



SatVision, Inc.
SVI
(1-918-542-9275)
Satellite Video Systems

27 March 1981

Mr. Barney Phillips
President
SATRX COMPANY
20790 Leapwood Avenue
Carson, California 90746

Dear Mr. Phillips:

We at SatVision wanted to inform you of the results obtained in regards to your Satrx Satellite Receiver. The system used included the following TVRO equipment:

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Most Sincerely,
Martin H.T. Schultz
Vice-President
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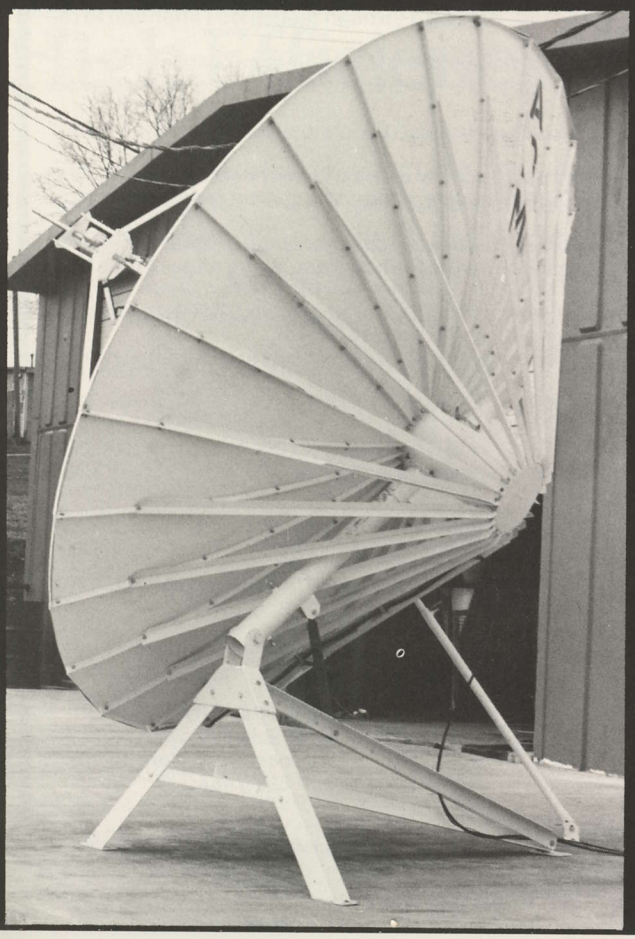

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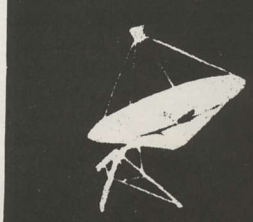

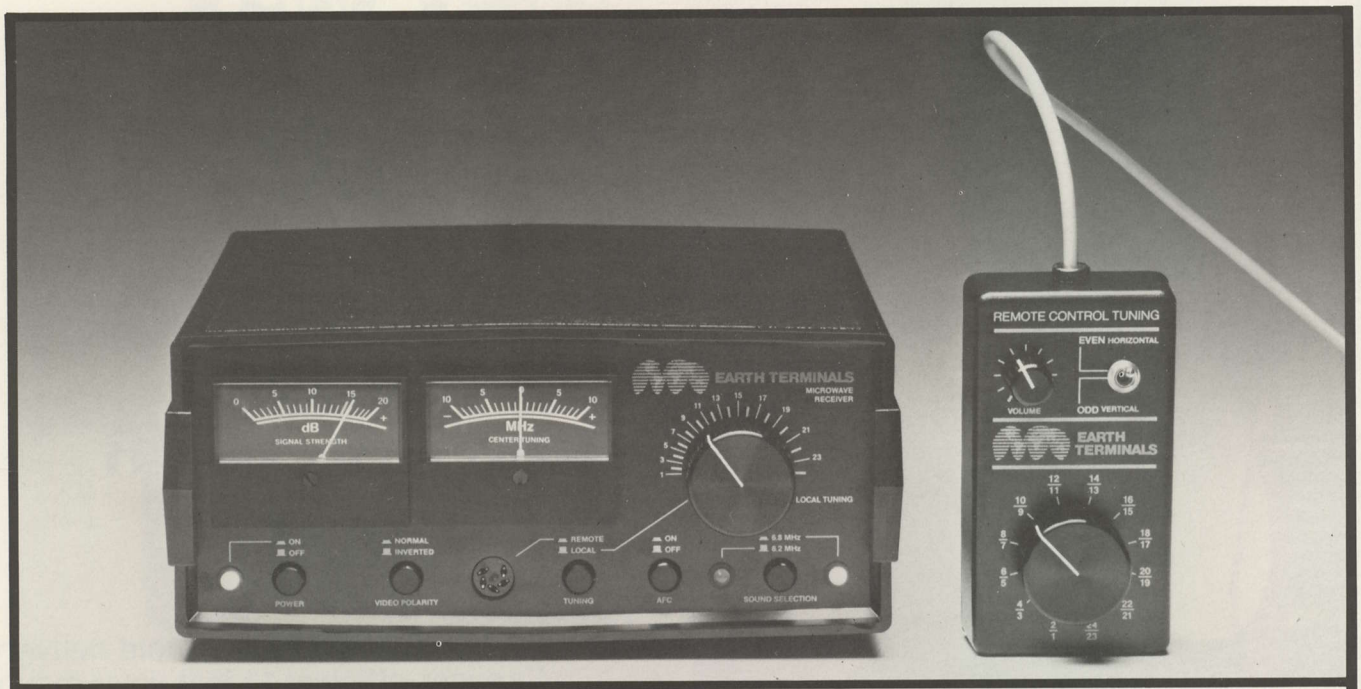

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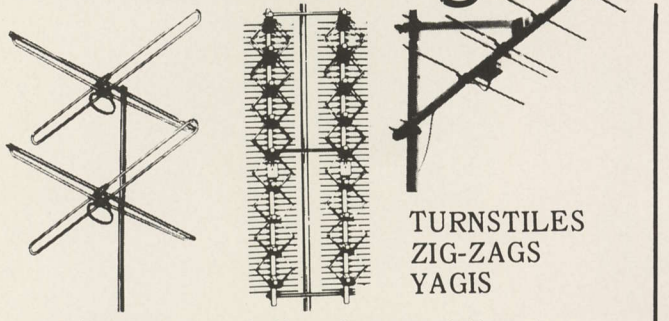

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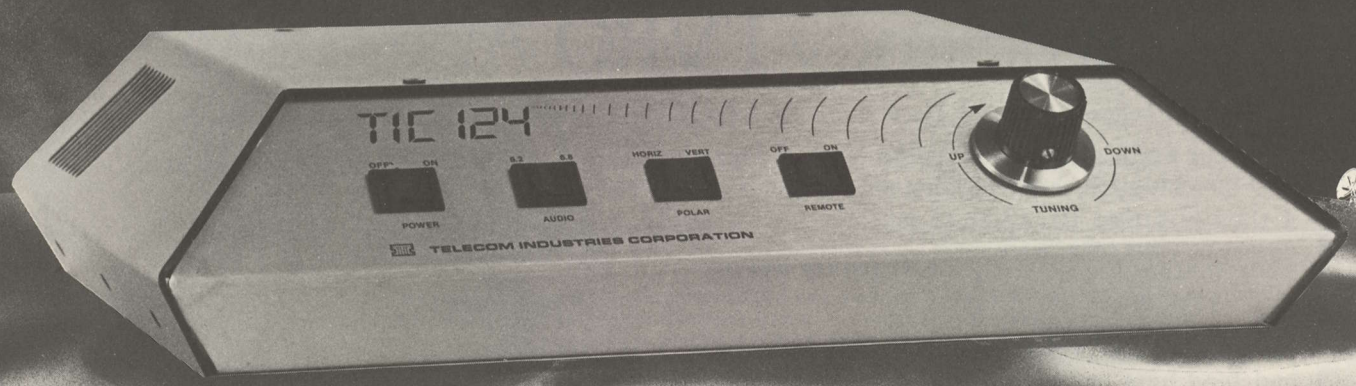

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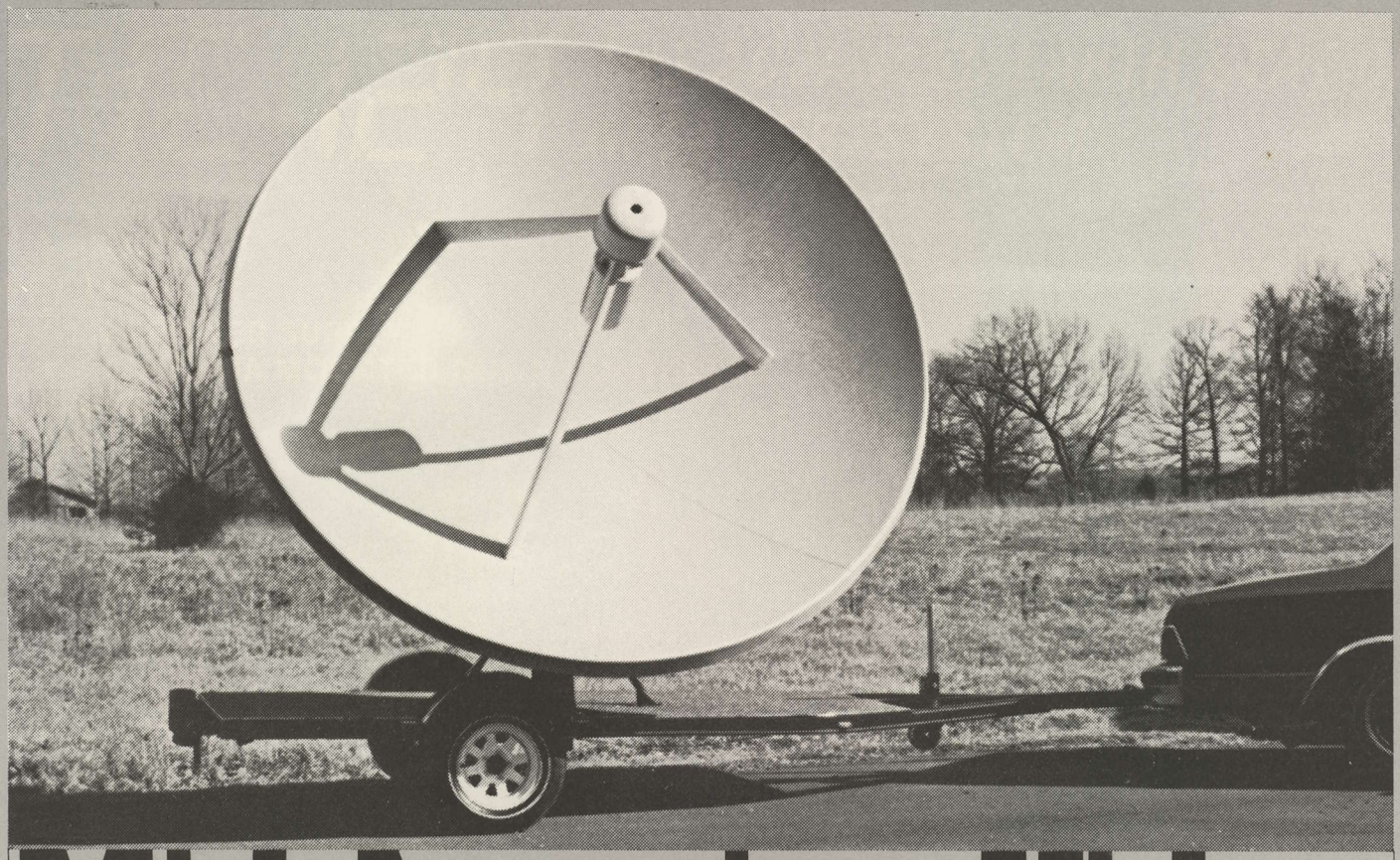
Complete earth station packages are available. Submit details of your requirements to Comtech Antenna Corporation, 3100 Communications Road, P. O. Box 428, St. Cloud, Florida 32769. 305/892-6111



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Reach For The Stars with WILSON

Wilson Microwave Systems uses the latest state of the art method of manufacturing the parabolic designed antenna. Resistance to distortation and instability is increased with the addition of a full screen mesh sealed within the ¼" thick fiberglass.

The 4pc construction of the dish provides easier handling, less installation time, and greatly reduced shipping costs.

For those areas that require a larger dish than the 3.35 meter, Wilson offers an addition that will increase the size to 4.0 meter. It is easily bolted to the outer edge and maintains the strength, while increasing the performance.

The Wilson antenna package includes antenna, Vari-Mount, manual satellite locators, LNA/Rotor mount, rotor, 100' of 4/C rotor cable, and a rectangular feed horn.

Wilsons unique "Vari-Mount" provides the easiest installation and mounting method available today. Simply dig 4 holes with either a post-hole digger or an auger, 4 feet deep. Form a base with 2 x 4's for a finished look, then insert the four furnished bolts. Fill with 12-14 bags of Redi-Mix and it is finished.

With the exclusive 4 point Williams' mount, you are assured a quicker installation and that the antenna will be more securely fastened to the Vari-Mount. The antenna struts aid in stabilizing the fiberglass for operational reception in winds of up to 50-60 MPH.

A ball bearing race allows easy turning of the antenna in changing to the different satellites. A scale is included on the base to assist in their location.

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The optional remote control feature allows you to control the movement of the azimuth and elevation positions of the antenna from the comfort of your easy chair – without having to go outside. This feature may be added at a later date, even after the manual system has been installed and in use.

The new Wilson Scalar Feed Horn offers an additional improvement to signal reception (.5 to 1.5DB) that will be immediately visible. Available as an option to both 3.35 and 4.0 meter antennas.

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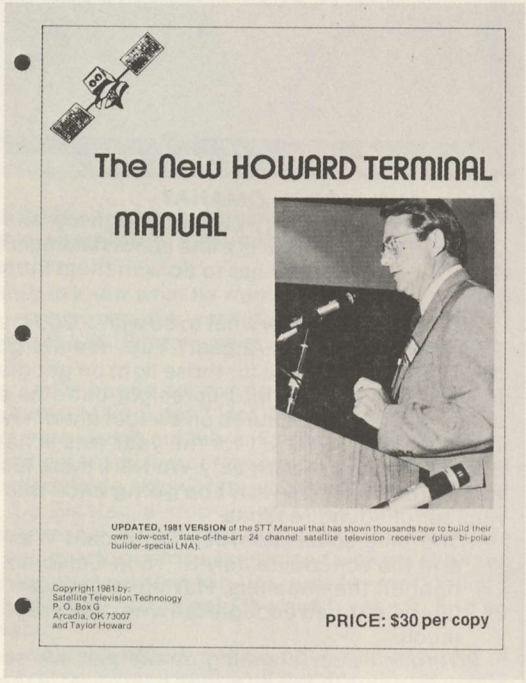
GOOD GRIEF -

STT HAS **TWO** NEW MANUALS...

Professor H. Taylor Howard has completely revised his most-popular-of-all STT Manuals. The **'New Howard Terminal'** tells you what the 1981 version of the popular Howard Terminal Receiver looks like, how to use the now available (from Robert Coleman) printed circuit boards, how to align and tune-up this top performing build-it-yourself double conversion receiver. Now that a complete set of circuit boards is available the good Professor wants receiver builders to have a top notch manual to go along with the boards. Large photos with parts called out, new easy to read and follow schematics and detailed parts lists are included. The latest version of the Howard Terminal Receiver requires very little in the way of alignment (only the 70 MHz bandpass filter requires real test equipment). Thousands of Howard Terminal design receivers have been built and are in daily use. This new-from-STT Manual brings you up to date with the most popular TVRO receiver project of all time. Price is still a modest $30 per copy from Satellite Television Technology.



SPACE General Counsel Richard L. Brown and Coop teamed up to produce the largest, most complete Manual ever offered by STT. In fact it is a double-manual with 72 pages; a veritable text book (we call it **The Low Power TV Handbook**) on everything you need to know to design, FCC license, build and operate a VHF (or UHF) low power TV station. Brown covers the licensing procedure and points out where you can save money by doing some of the license preparation work yourself. Each attendee at SPTS '81 Washington received this exciting double-manual as a part of their registration packet. **NOW** it is available to the general industry. In the design and operational portion Coop describes everything from low-cost / low-power ten watt VHF stations (total cost **with** TVRO terminal **under $6,500**!) to the complex world of transmitting antenna systems. Each part of a typical station (and some not so typical stations) is detailed for you; identifying specific pieces of equipment which Coop knows work because he is using them himself at West Indies Video. This 'Double-Manual' is priced at $60 from STT and delivery is immediate. It will save you thousands.

See STT Order Form opposite Page T16, this issue of CSD.

COOP'S COMMENT ON PROGRAMMING

THEY HAVE PIGS IN OMAHA?

In the popular country-pop song 'Convoy' and in the movie of the same name there is a line about hauling pigs to Omaha. "They ought to know what to do with them there..." the lyrics go.

But will Omaha know what to do with 1,000 or more satellite TV enthusiasts in mid-August? **Yup. We are going to Omaha.** That's in Nebraska for those light on geography. It is also in the middle of the bird boresight patterns and I've seen some very decent pictures on six foot antennas in Nebraska.

The second SPTS '81 for the year **was** scheduled for San Jose (California) in early July. We were there **last** July 4th and had a great time. **We won't be going back this July 4th** for a number of sound reasons.

1) The time-space between the recent Washington SPTS and the scheduled July SPTS in California is simply too tight on the suppliers. Having to show up at four month intervals is bad enough; ten weeks between 'shows' is too much.

2) Through poor planning on my part we settled into the west coast **in the summer**, east coast in the spring, south in the late fall routine. That cut out one very important segment of the US; the midwest. And with the constraints of winter we really only have one time of the year that makes full sense there; summer.

3) The logic is that it makes **more sense** to invade the west coast **in the fall** since winter is far less of a problem there. Further logic suggests that if you have been to Northern California one year, you should rotate to southern California the next.

So we will be holding the second SPTS '81 in Omaha in mid-August. August **14** through **16** to be exact. **Why Omaha?**

Yes, Chicago would **seem** to make more sense. We tried there. We tried Chicago for the spring but found the only open dates were back in early March when (this year excepted) Weather Bureau historians told us we had an 80% chance of being below freezing in the daytime and a 50% chance of heavy snowfall. With so much of the show outside (with the antennas) it didn't make much sense to force John Hastings to stand out there under his dish with icicles dangling off his nose. That's when we decided to head east to D.C. in search of reasonably warm weather and the earliest possible 'open date'. But we did not give up on Chicago. Actually we spent considerable time looking at potential sites, surveying look angles, open dates, room rates, ground transportation availability **and the union situation**. Chicago has been well known for years as being a place where trade shows pay through the nose for union help. Only Las Vegas is 'worse'. If you contemplate local 'regulations' that tell you nobody can physically move a table or plug in a piece of equipment, in a booth, **without a union employee doing the 'work'** you begin to get a picture of how expensive this becomes for exhibitors. Chicago is a nice place to visit. It has an exciting Mayor. It is not a nice place to hold a show.

Omaha is probably not high on your 'must visit' list. You will be very pleasantly surprised to discover it is a nice city with modern everything and still reasonable prices. The motel rates are under $40 for example whereas in Chicago they start off at $80 and work up. The Omaha facility where SPTS '81 will be held is owned and operated by a 'satellite TV nut'. I mean that kindly. The owner of this particular motel has his own home terminal. He loves it and is presently upgrading to a fully motorized system. His facility is big (as in spacious), quiet (as in ideal for the seriousness of our Seminar), and comfortable (as in being as nice as most anything Chicago has to offer). Most of all it is a city where you can stay for a few days and not feel as you leave as if you left your whole savings account in some motel till.

CONFUSING BIRDS...

Although programming on FI has been pretty stable of late (with the exception of testing of previously reported 'dead' TR1 3) the other video-used birds have been aflood with new viewing material. **Getting a handle on it all has become an extremely complex proposition.** And we are torn between determining just how much **need** is there for an accurate, **detailed** analysis month by month, and an accurate but less detailed 'general over view'. Certainly with the launch of FIII-R in the next sixty days, and the subsequent launch of FIV near the end of the year, many substantial changes are in store. And we'll see that you understand what this means in the way of new programming services plus changes in existing services as it happens; and before.

However efforts to report monthly on the minute by minute changes and programming sources popping up all over the birds have never been very successful. People who **profess** to know what is going on have proven unreliable as far as forwarding details on a regular basis and we hate to start a regular listing section if it is going to be there one month and gone the next. So the question becomes just **how much information is really required?** What do you need to know and how often do you need to know it? We'd like to hear from you!

COOP'S SATELLITE DIGEST (Programming Section) is published monthly by Robert B. and Susan T. Cooper doing business as Satellite Television Technology (STT). Editorial offices located at West Indies Video, Grace Bay, Providenciales, Turks & Caicos, BWI. Communication with business office is through Business office at P. O. Box G, Arcadia, OK 73007 (405-396-2574); Rick Schneringer, Manager. Photography, Kevin Paul Cooper; editorial assistance Tasha Anne Cooper. STT produces various manuals, videotapes, guides and texts plus conducts the twice annual SPTS and once-annual SBOC events. STT is not affiliated with any manufacturer or distributor of satellite communications equipment. **CSD** subscription $50 per year US / Canada / Mexico; $75 elsewhere.

CASE HISTORY OF A CUSTOMER MOTORIZED DISH INSTALLATION

WILLARD EAGAN - rancher, innovator and satellite TV buff enjoys his completely automated TVRO systems.

THE WILLARD EAGAN STORY

Space technolgy has come to Arapaho. This wind swept part of Washita County, Oklahoma, may seem to some as a strange place for a private earth station, but not to Willard Eagan.

Eagan has farmed the red soil for 41 years, recently retiring to see his sons carry on the tradition. Being more than 100 miles "as the crow flies" west of Oklahoma City and the nearest television transmitters, Eagan has never been able to enjoy quality television reception. Last year all that changed. Willard noticed articles and advertisements about home satellite receiving stations and began inquiring about them. It wasn't easy and the choices were few. After being frustrated in his search for quality equipment, Eagan's daughter, who was living in Tulsa, told her father of a "satellite place" in her city. She had noticed a large dish antenna on display near a busy street.

Upon his next visit, father and daughter located the dish and visited the showrooms of SatFinder Systems (a division of Rieco TV Service, Inc.). Eagan's requirements were simple, due to his remote location, he wanted absolutely reliable electronic components and simple operation since he had no electronics aptitude or background. Add to this the fact that the western Oklahoma winds commonly reach 50 mph and more. He knew nothing of satellite navigation, azimuth and elevation, LNAs or Coop. Furthermore, he didn't want to know. He just wanted good pictures and simple operation. Thus far in his search he had found neither, only marginal electronics and systems and the capability for simple foolproof remote rotation was nonexistant.

Arriving at SatFinder Systems, he met Jim Mackerelle and was told that the SatFinder System would meet his requirements, **period**. Well, Eagan was used to innovation. As a successful farmer and rancher, he had the first tractor with an enclosed cab in his part of the country, the first four wheel drive tractor and then the first air conditioned tractor. He was always surprising his far flung neighbors with change and new technology in agricultural equipment. But this "satellite business" was something else again. Even though Willard had a knowledge level in this field that was hovering somewhere between little and none, still he didn't ride to town on a turnip truck. He knew business, he knew quality and he knew what he wanted...good pictures, on multiple birds and simple operation.

If you have met David MacZura, Jim Mackerelle and the others at SatFinder Systems, you probably know by now that they are doers first and talkers second: There didn't remain much to do...Eagan knew what he wanted and Jim knew what he had. Jim led him into the next room and proceeded to introduce him to the SatFinder way of watching satellite television.

A hint of a smile began to invade Eagan's face. Out in western Oklahoma, talkers don't last long or fool many. They let the wind do the blowing out there. The proof of the pudding in men and equipment is the performance. Eagan found he didn't have to go outside, fiddle with switches or meters, sight on the stars, be Einstein's step-sister, know how to speak fluent "computereese", or any of a long list of unacceptable behavior. He had only to push the button and pick his channel. **"The dang thing just worked for Jim, and for me"**, Willard said. **"It did just what 'ol Jim said it would, yes sir, and so many channels."**

"Back home we get a **piece** of three channels and a lot of snow (on the screen). When I found out that I could get everything that's up there, all channels, all satellites, without so much as leaving my living room, I said...what more could I want? And I had never received a picture as clear and sharp as the one I was looking at. Well, 'ol Jim had his price and I had mine and we soon came together. I guess what really clinched the whole deal was the fact that they were going all over the place putting in these systems. From New York to California, they were getting good pictures and then going off

DISC AND DISC - Satfinder automated dish system in place on the western prairie along side multi-gang discs of a different sort.

By: Larry W. James
Satfinder Systems
Tulsa, Okla.

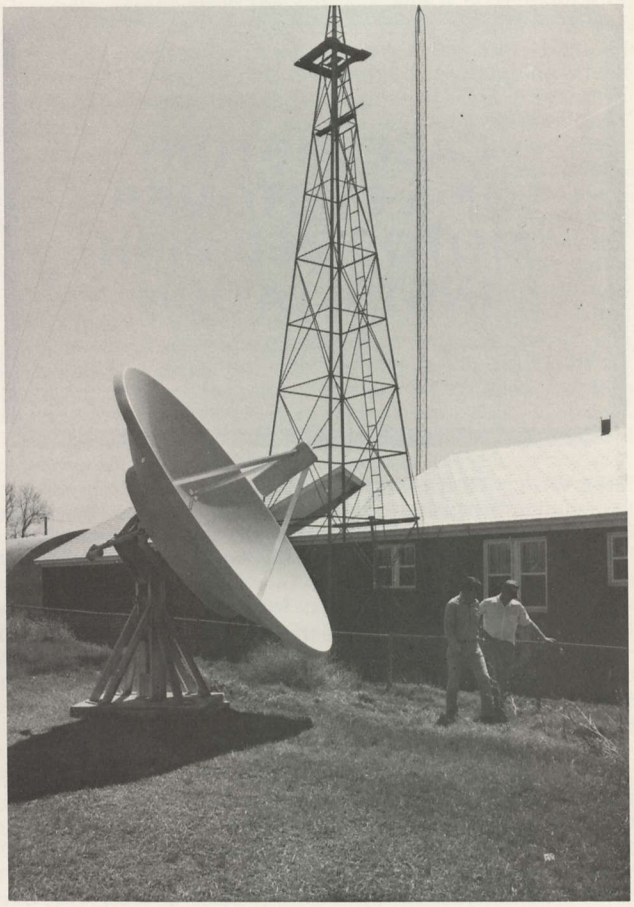
HIGH AND LOW - high atop a former windmilll tower rests the Eagan conventional TV antenna. More than 100 feet below, the ten foot dish that made the huge rig an antique.

and leaving them. I thought that if they were holding up that well, then they must be alright. I told Jim to bring it out. Jim told me that I'd get just as good and just as many pictures back home as they did in Tulsa and I took him at his word."

Six days later the crew (with Jim supervising) arrived at Eagan's farm some three hundred miles away. The complete installation involved two days. The first day the pad was poured with a special jig utilized to precisely set the mounting bolts in solid concrete and all cables were buried from the pad to the house. The crew cleaned up and left. Several days later, they returned with a special made trailer with an on-board crane. Within minute they had set the entire antenna and mount assembly on the pad and it was permanently affixed. The necessary connections were made on each end, tests were conducted, the SatFinder Command Control was programmed for all of the present satellites and **immediately** he had beautiful reception.

"**I was impressed**", said Eagan, "with the installation procedure and the quality of the components. The entire system went together as well as it worked. The bolts on the pad matched right up with the base of the mount as well as everything else. Everything from the dish to the back of my television set was provided and installed. The engineering department had really done their homework. As I watched I learned by asking that although black tape holds wires together, little plastic things called wire ties do it better. The reason for the sandy color and pebble finish on the fiberglass dish was to dissipate the solar heat that would otherwise be focused on the LNA. I noticed also that the antenna support assembly was galvanized to withstand the weather. My impatience to get on the air seemed to have little effect on the men. They methodically continued, attending to small details, until the installation was complete." When the crew drove away about 8:30 PM that same evening, Eagan was on the air, operating the system by himself and receiving excellent pictures. There was no mess, exposed wires or cable or torn up yard left behind.

Willard is not much of an authority on the SatFinder service department. From the day that Jim and the crew drove away until this, there has not been a single service call to the Eagan home, nor a need for one. Immediately upon departure of the installation crew, Eagan could "roll on his own". Channel to channel, satellite to satellite, no misses, no problems, no service calls. It is a documented fact that his complete TVRO system is untouched to this day, and is daily scanning the birds and "delivering the mail". Willard leans toward sports and CNN news. Mrs. Eagan likes the movies, but only the



family fare. Willard says "she can't stand those adult movies, and then added with a grin, "I can stand a little more than she can". Both of them can tune in with a touch on the keypad to any of the satellites, without leaving their living room. They enjoy that. "I'm convinced that this is the Cadillac of them all", Eagan says repeatedly.

Months later, Willard, finding himself in Tulsa on business, drops by the SatFinder offices. No complaints, no problems, just wondering what new improvements might be rolling off the line. He mentions that the two gentlemen from Sweden that had visited the SatFinder Systems headquarters had visited him. They had been invited to see for themselves a home TVRO system at work in the real world. They put his sytem through it's paces without a hitch (months after installation without a single bit of attention or a tune up). He mentions that they were impressed to say the least (they also had a good bit of fun driving his monstrous four wheel drive tractors).

The Eagans are happy, satisfied, they got what they paid for. They sort of like it when their neighbors slow down a little when they pass by, or find the excuse they need to hold their gathering at the Eagan home and watch the best television reception in the county.

REPLY TO OPPOSITIONS TO PETITIONS TO DENY

SPACE, (The **S**ociety for **P**rivate **a**nd **C**ommercial **E**arth Stations), hereby files its Reply to the "Oppositions" of Teleprompter Corporation (Teleprompter) and Group W (Westinghouse) to SPACE's "Petition to Deny" the proposed transfer of control in the above-captioned matters. SPACE is an association representing owners and users of earth stations that receive communications from satellites as well as

manufacturers, distributors and sales representatives of satellite earth station equipment. SPACE and its membership believe the public deserves direct access to satellite delivered video communications available to cable television systems and that subscription programming so received should be paid for. SPACE's opposition to the pending transfer of control is premised upon the refusal of Teleprompter's subsidiary, Showtime, Inc., to sell its programming to non-CATV owners and users of satellite receive-only earth stations. This refusal is inconsistent with Commission policy, and it is a concerted refusal to deal in violation of the antitrust laws. A grant of this transfer without proper remedial conditions will sanction and thereby compound Showtime's anticompetitive behavior and a grant of this transfer will authorize a still larger entity, Showtime's new owner, to act anticompetitively.

A principal objective of SPACE is to promote the private use of earth stations in order to provide American citizens with greater diversity of television programming and to enhance their educational, informational and entertainment opportunities. In just six years satellite delivered television and subscription programming in the United States has blossomed. These program distribution systems presently provide additional sources of programming to the American consumer as well as increased business opportunities to the equipment manufacturers and suppliers. A new industry is opening up new channels of communications for all Americans, particularly those residing in rural areas who have been long disenfranchised in their television viewing opportunities. This industry also promises to promote competition with cable television in the marketplace and to provide additional viewing opportunities for the American consumer. But this industry and the public it serves is directly threatened by the anticompetitive conduct of Teleprompter and the apparent continuation of such conduct by Westinghouse.

SPACE Standing In Proceeding

Teleprompter, acting as if the transfer of control were a fait accompli, chooses not to defend Showtime's anticompetitive practices, but instead, confines most of its argument to the question of standing. Amazingly, neither does the intended licensee, Westinghouse, offer any explanation for Showtime's conduct but chooses to rely on Teleprompter's unresponsive Opposition.

SPACE's Petition to Deny contained a signed affidavit attesting that Showtime refused to sell its programming to the owners of receive-only earth stations. Showtime's policy results in economic injury of the most blatent sort to SPACE's membership and to others who are wrongfully harmed economically or denied viewing opportunities afforded other Americans. Teleprompter admits that its subsidiary refuses to sell its product to earth station operators. It does not, and cannot, deny that such policy harms SPACE's membership and others.

That harm can only be compounded by a grant of the application for transfer of control and approval of a merger which will result in the establishment of an even larger communications conglomerate with an established history of anticompetitive conduct and refusals to deal. **See Packaged Programs, Inc. v. Westinghouse Broadcasting Company,** 255 Fed 2d 708 (3rd Cir. 1958). **See also General Electric Company** and **Westinghouse Broadcasting Co.** 22 RR 307 (1961). Incredibly, Westinghouse does not even address the issue of Showtime's refusal to deal thereby permitting only one reasonable conclusion: the anticompetitive policy will continue when the transfer is granted. Indeed, through its 80% interest in Home Theatre Network (HTN), another program supplier, Westinghouse is already following in Teleprompter's footsteps. Based on the correspondence received by SPACE's membership, HTN as part of the oligopoly of cable television affiliated program suppliers is denying its product to non-CATV earth station operators. In fact, HTN goes as far as to ask others for information about any other pay television suppliers selling services to an earth station

operator. Again, the injury to SPACE and its membership as a result of this policy is severe. Furthermore, this injury is not limited solely to SPACE and its membership. Literally millions of potential viewers are being denied subscription programming because of anticompetitive business practices. By voicing these concerns, SPACE also, and appropriately, represents interests far beyond its membership. **Office of Communications of the United Church of Christ v. FCC**, 359 F 2d 944 (D.C. Cir. 1966)

In support of its assertion that SPACE does not have standing to oppose the merger, Teleprompter argues that SPACE does not "express public interest concerns". **Opposition of Teleprompter**, page 62. Teleprompter's blindness in this regard, and Westinghouse's acquiescence thereto are plainly selfserving and underscore the necessity for Commission intervention. The refusal to deal on the part of Showtime and HTN is at the very heart of the Commission's public interest responsibilities. Congress has charged the Commission to be particularly concerned respecting monopolization and antitrust matters. **See Section 313 and 314 of the Communications Act of 1934.** Showtime's and HTN's practices have already retarded the expansion of communications services and harmed all members of the public who wish to receive subscription service. If permitted to continue, these practices will further promote the monopoly of existing cable television operators and thereby restrict the viewing opportunities of the public.

Teleprompter incorrectly relies upon **Simon v. Eastern Kentucky Welfare Rights Organization** 426 U.S. 26 (1976). **Simon** involved an unsuccessful attempt by a group of indigents to alter an IRS Ruling granting tax exempt status to hospitals which failed to provide anything other than emergency service to indigents. In **Simon** the Court held that the petitioners did not have standing because they were unable to show an injury to themselves which would likely be redressed by a favorable decision of the Court. Teleprompter argues that if the Commission were to deny this transfer, that would not necessarily mean that Showtime would sell its product to the owners of satellite earth stations.

The **Simon** case is inopposite for several reasons. The rules governing a denial of tax exempt status bear no relationship to the Commission's public interest responsibilities with respect to licensing users of the spectrum. SPACE is alleging a concerted refusal to deal with obvious anticompetitive causes and effects. The Commission has a unique mandate to ensure against anticompetitive practices by licensees and others who profit from the use of the spectrum. **See Sections 313 and 314 of the Communications Act of 1934.** Anticompetitive policies and practices by its licensees are completely within the Commission's jurisdiction. Unlike **Simon**, the commission has the offending parties squarely before it. Also, while a denial of tax exempt status on the grounds alleged by the Petitioners in the **Simon** case might or might not result in a change of policy on the part of the hospital, the denial of the transfer of control based on the antitrust grounds alleged by SPACE would certainly achieve the desired result. That is, the Commission can prevent Teleprompter from transferring its licenses to Westinghouse unless, for example, Westinghouse remedied Showtime's anticompetitive practices.[1] Also, remedies other than denial of the transfer are available to the Commission. A conditional grant structured to remove the offending conduct of Showtime and HTN is one alternative. Such a grant would per force change Showtime's conduct and make **Simon** inapplicable. Given the possibility of such a remedy, standing cannot legally be denied under **Simon**.

Space has demonstrated the harm to its membership and the public at large. Indeed, this harm is not denied by Teleprompter. In view of the Commission's unique public interest and antitrust responsibilities under the Communications Act, it is an appropriate forum for a resolution of these issues. The actions suggested in SPACE's initial pleading will prevent continued harm by conditioning the transfer on the elimination of the harm or by calling into question the very qualifications of Teleprompter and Westinghouse to be Commission licensees. Under such circumstances standing is present. **See Office of Communications of the United Church of Christ, supra.**

Anti-Competitive Actions

The overwhelming trend in the cable television industry is for the largest multiple system operators to own programming services. The following is a list of eight of the ten largest cable companies with their affiliated programming services.

Name	Affiliated Program Supply Companies
Teleprompter Corp.	Showtime
American TV & Communications Corp.	HBO, Cinemax
Tele-Communications, Inc.	Taft-TCI Programs for Cable
Cox Cable Communications Inc.	Rainbow
Warner-Amex Cable Communications, Inc.	The Movie Channel, Nickelodeon, Alpha & the Music Channel
Times Mirror Cablevision	Spotlight
Viacom Communications	Showtime
U-A Columbia Cablevision, Inc.	USA Network

Currently these cable companies serve approximately 7 million subscribers which is nearly 40% of all cable subscribers. This concentration of cable service by the eight largest cable companies is expanding rapidly. Operators in this group have received the overwhelming majority of the major

franchise awards recently granted. Newly franchised cities in this category include: Pittsburg, Cleveland, Cincinnati, Dallas, New Orleans and many others. During the last year alone, these operators have received new franchises to serve in excess of 4¼ million homes.

These operators have affiliated with, developed, or purchased program suppliers for several obvious reasons. First, non-broadcast programming is essential to the development of big city cable television. Having an ownership interest in such a supplier guarantees access to such programming.

At present the trend to share or tier programming by the cable company/program suppliers provides incremental revenues to both the cable operator and the program supplier.

Furthermore, the refusal to share with non-cable earth station operators ensures a demand for cable television in the majority of the country which is yet to be franchised. As a result, rural residents are again discriminated against and told to wait for subscription programming as are inhabitants of cities not yet wired for cable.

The sale of virtually all of these subscription services to private and commercial earth station operators is severely restricted. Showtime, HTN and Home Box Office withhold their product entirely from this market. See Attachment 1, 2 and 4. The Movie Channel is sold to earth station operators in only a very few cases where there is no prospect that it will be sold to a nearby cable television system. Without one of these program offerings, it is unlikely that a viable earth station subscription service can be maintained.

The future does not promise any different result. While SPACE and its membership looked to the commencement of the Rainbow Service as a potential source of programming, it too has indicated that it will not sell its programming to the owners of receive-only earth stations. We note that it too is owned by an oligopoly of large cable television companies.

The existing refusal to deal is being seriously compounded by the trend towards tiering of subscription services, which Teleprompter and Westinghouse cite as a defense to anti-competitive allegations. **No subscription service which is provided by a cable television system in a community is being sold to an earth station operator in that community.** As the Movie Channel is increasingly included as one of a tier of services, the tiny crack which earth station operators have seen in the oligopoly's united front is rapidly being sealed.

Teleprompter attempts to convince the Commission that recent growth of programming options available to cable television operators is evidence of competition. This growth of services does not in any way aid the public not served by cable television. Nearly all of the new services becoming available are "narrowcast" offerings intended for specific markets, e.g., children, sports, or cultural enthusiasts. The demand for such programming alone is not, in most cases, sufficient to underwrite the costs of installing an earth station. Second, the trend is for these services to follow the lead of the program supplier oligopoly and deny their product to the owners of earth stations. Aware of the power of Teleprompter and other cable television operators and usually owned by

[1] **Through its misplaced** reliance upon **Simon**, Teleprompter implies that SPACE wishes Teleprompter and Showtime to "open wide their doors" to their program offering. **Opposition of Teleprompter**, page 64. SPACE has not taken the position, as did Teleprompter a decade earlier, of refusing to pay for the programming available off the air. As responsible members of the communications community, SPACE's membership has repeatedly offered payment for subscription service, only to have such offers rebuffed and service denied. SPACE does not wish a free ride. It wishes only to purchase the Showtime programming at fair marketplace determined rates. Because of the economic power possessed by the major cable television operators, this fair marketplace does not exist.

SPACE KEEPS PRESSURE ON SHOWTIME

one of those companies, most of the newer services either will not sell their programming to receive-only earth station operators or will do so only under extremely restrictive conditions.

Next Teleprompter and Westinghouse argue that the is significant competition for franchises effectively regulates the marketplace. As the Commission is aware major city franchising will cease in a relatively short period of time. Once the franchising process is over in a given community, so is any remnant of competition. As Westinghouse candidly states: "These local cable companies now in existance are local monopolies..." **Opposition of Group W**, page 12. Because of the policy of Showtime and HTN as well as the other program suppliers, the consumer who resides within an area franchised for cable television and desires multichannel service has no choice but to obtain it from the cable television operator. Once the franchise is granted, the rates, terms and conditions under which service is offered are no longer subject to direct competitive pressure. This monopolized market is not in the interest of anyone except the program packagers and cable operators. They can set the rates for subscription service free from regulatory or competitive pressure. Under existing Commission policies, local authorities may not regulate subscription services.

The Commission has found that a monopolized market does not function as efficiently as a competitive one. It has stated that it will "...encourage competition in a previously monopolized market wherever technological an economic conditions allow". **In Re Petition of Shenandoah Telephone Company**, FCC 80-781 ___ FCC 2d ___, released January 15, 1981, page 5. See also **Policy And Rules Concerning Rates for Competitive Common Carrier Service and Facilities Authorization Therefor.** FCC 80-629, released November 28, 1980, 45 Fed. Reg. 76148 (1980) cited therein. (Competitive Common Carrier Service.)

Technological and economic conditions not only allow but cry out for competition to multichannel cable systems. Earth stations are the only near term source for that competition. They can provide competition to the cable monopolies, and also serve areas not presently being served. Showtime's and HTN's position together with that of the other suppliers, effectively denies any service to vast non-cabled areas of this country which could be served by entrepreuners who install earth stations.

Commission Should Not Gloss Over SPACE's Allegations

In their opposition to SPACE's Petition, Westinghouse and Teleprompter appear to argue that because of the limited regulatory role which the Commission now observes wirh respect to cable television, it is inappropriate in this proceeding for the Commission to consider the character issues which SPACE and others have raised. On the contrary, it is

well settled that while the Commission cannot decide antitrust issues as such, it has the obligation to consider antitrust questions in the context of its licensing process. See, e.g. **United States v. R.C.A.**, 358 U.S. 334 (1959); **FCC v. R.C.A.** 346 U.S. 86, (1953); **N.B.C. v. United States**, 319 US 190, (1943); **Radio Relay Corp. v. FCC**, 409 F. 2d 322, 326 (2d Cir. 1969). It retains a duty of continued supervision of the development of the communications industry as a whole and this includes being sensitive to possible anticompetitive effets. **National Association of Regulatory Utility Commissions v. FCC**, 35 RR 2d 1484 (US App. DC 1976).

Contrary to Teleprompter's assertions this obligation routinely extends to an examination of the character qualifications of a license transferor as well as the transferee. See e.g., **Cox Broadcasting Co.** 78 FCC 2d 684 (1980). Otherwise, any entity whose character was placed in question could avoid any potential sanction by arranging to transfer the license in question to another entity.

Indeed, the Commission itself has already replied to these arguments. In paragraph 12 of **In Re Westinghouse Broadcasting Company and Teleprompter Corporation,** FCC 81-38___ FCC 2d___ (1981), wherein the Commission granted a temporary waiver of the cross ownership provisions, it specifically reserved to this proceeding an examination of anticompetitive issues and Teleprompter's character qualifications:

> We are not being called upon at this point to weigh the merits of the application for transfer of control of Telecompter radio licenses to Group W or to judge the larger issues of media concentration and character qualifications which **inter alia** those deliberations necessarily entail.

Under these circumstances the allegations respecting Teleprompter's character, in light of its anticompetitive activity must be resolved.

Teleprompter's Lack Of Knowledge Is Incredible

Teleprompter, in any event, attempts to wash its hands of the issue stating that it did not participate in the decision to withhold product from the owners of receive-only earth stations. **Opposition of Teleprompter**, page 2, and it had no knowledge of such decision until the December 11, 1980 telegram from SPACE. **Opposition of Teleprompter,** page 70. Pursuant to its agreement with Viacom, Telepromter states that it appoints two members to the Showtime Management Committee but that Showtime's President is subject to the direction of an executive officer of Viacom. **Opposition of Teleprompter**, page 70. Teleprompter also states that it and Viacom have equal management responsibilities pursuant to their Partnership Agreement.

It is surprising, to say the least, that a company as sophisticated as the largest cable television operator was "unaware" of a marketing practice which effectively closes off a huge potential market for revenues at a time when its subsidiary, Showtime, has yet to earn a profit. Perhaps this may be accounted for by the fact that the affidavit accompanying Teleprompter's Opposition is signed by its General Counsel instead of an operating officer. In any case, Teleprompter's purported ignorance strains credibility, as does Teleprompter's statement that the practice is "beyond Teleprompter's control". **Opposition of Teleprompter**, page 71. Such a decision has a significant affect on the viability and profitability of Showtime and obviously could be changed were it not for monopolistic motivations.

Teleprompter's response in this area is also internally inconsistent. On the one hand we are told that Teleprompter is not aware of the marketing policies of it subsidiary. On the other hand we are told that "Showtime's licensing agreements with its suppliers of theatrical motion pictures limits Showtime's distribution rights in many ways and restricts Showtime from distributing motion pictures to individual users." **Opposition of Teleprompter**, page 71. It is hard to believe that Teleprompter would be aware of the specific details of Showtime's contracts with its motion picture suppliers while not being aware of its policy with respect to the sale of its services. A material question of fact exists here. How is it that the Movie Channel sells programming to non CATV earth station operators? At whose insistance were such provisions, if they exist, included in Showtime's contracts? Are they boiler plate provisions or matters of serious negotiation? All these questions must be examined under the mandate of Section 309 of the Communications Act of 1934. They are material questions of fact affecting the public interest. The Commission, for example, has required full nondiscriminatory service regardless of the provisions in a contract. **In re Renaissance Broadcasting Company, WRBV-TV**, 75 FCC 2d 441 (1980). In any case, Teleprompter does not assert that these contracts prohibit the sale by Showtime to non-CATV earth station operators, yet Showtime refuses to deal with this market. Nowhere in its entire pleading has Teleprompter justified this potentially anticompetitive behavior.

Teleprompter appears to argue that the policy of not selling to earth station operators is strictly a marketing decision. However, a marketing decision which has the effect of excluding traders from the market by means of a combination or conspiracy is "...so inconsistent with free market principles embodied in the Sherman Act that it is not to be saved..." **United States v. General Motors** 384 U.S. 127, 146-147 (1959). Through its partnership understanding with Viacom and their control over Showtime precisely such a combination exists. Lastly, nowhere does Teleprompter indicate that once it learned of Showtime's practice did it do anything to dissapprove of, or change that practice. Even were we to believe Teleprompter's statements, acquiescence may be viewed as an adoption and approval of Showtime's refusal to deal. The same is true of Westinghouse acquiescence to Showtime's policy as well as the policy of HTN.

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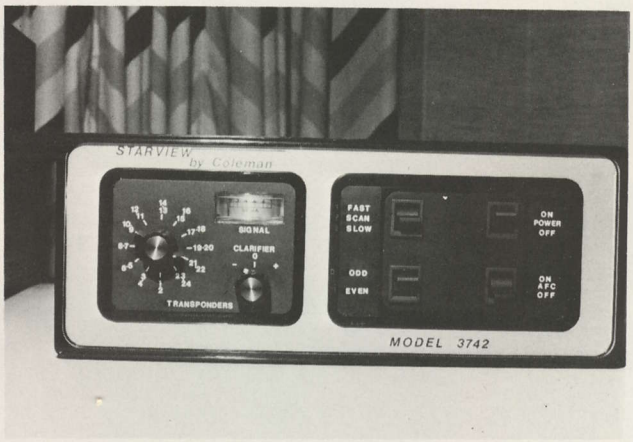

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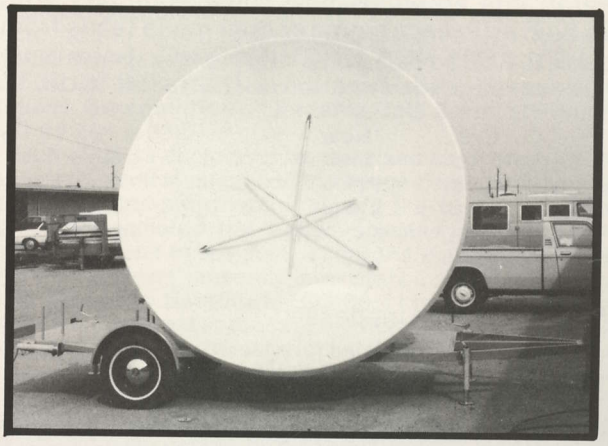
Get in on the ground floor as a TVRO dealer in your area! Starview Systems provides you with everything you need; professional instruction plus the finest mobile sales terminal on the road today. Included is a 10 foot Starview parabolic equipped with rotating feedhorn, Avantek 120 degree K LNA, top of the line Starview 24 channel tuneable receiver, 75' of coaxial and connection cables plus a trailer to get you to the demo site and operational in 30 minutes time. And the price? An unbelieveably low $6,495!!!



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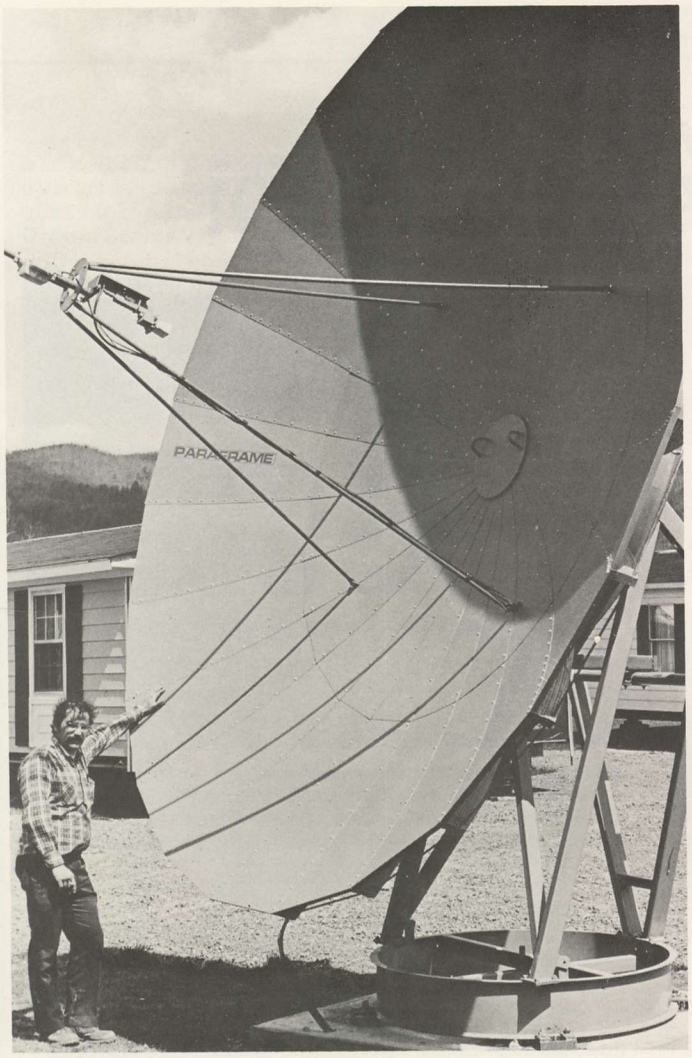

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*Add $300 for dual mode feed.

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ET/4.85	28.0	26.8
ET/6.00	26.1	24.9

*EIRP's should be 1.5 dB higher for transponders with numerous subcarriers.

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The Commission Possesses Ample Jurisdiction

Teleprompter argues that the Commission cannot regulate entitles such as Showtime. It also argues that there are no conditions which would justify the Commission's exercise of ancillary authority to regulate Showtime's marketing practices. **Opposition of Teleprompter,** page 68. First the focus of SPACE's concern is the anticompetitive practices of Teleprompter and Westinghouse, both Commission licensees. While this conduct is most clearly manifested in the concerted refusal to deal engaged in by subsidiary companies, that fact does not render it beyond Commission jurisdiction. See **RKO General, Inc.**, 47 RR 2d 921 (1980).

Also Showtime uses regulated interstate satellite communications services to deliver its programming. That programming is displayed over a conventional television set and may be indistinguishable from conventional television to a subscriber scanning his dial. Conventional television service is regulated pursuant to Title III of the Communications Act of 1934. The Commission must also regulate that which is "reasonably ancillary to the effective performance of... its...various responsibilities for the regulation of television broadcasting." **United States v. Southwestern Cable Co.**, 392 U.S. 157, 178 (1968). This jurisdiction extends to "activities in an area...intimately related to the communications industry." **GTE Service Corp.**, 474 F. 2d 724, 731 (2d. Cir. 1973). At the very least Showtime's activities are subject to ancillary jurisdiction.

In fact, Showtime's service is subject to direct jurisdiction. The Commission's Network Inquiry Special Staff has, for example, concluded that the Commission has direct authority over entities and activities that own, operate or use interstate communications facilities and that are engaged in conduct which has a significant impact on the Commission's ability to carry out its statutory obligations. (**Network Inquiry,** pp II-14 through II-139). Showtime's anticompetitive behavior has a direct and significant impact on several Commission policies. Showtime's restrictive policy operates to discourage the realization of the competitive benefits surrounding the Commission's "Open Sky" policy towards domestic satellites. Second, Showtime's refusal to deal with the owners of private earth stations serves to encourage the expansion of cable television while shielding that industry from the rigors of potential competition. This result is inconsistent with Commission policy which seeks to foster competition wherever technologically and economically possible. **In re Petitions of Shenandoah Telephone Company, Supra, See Competitive Common Carrier Service, Supra.** The harm done the public as a result of these effects requires regulatory redress. Under these circumstances jurisdiction over Showtime certainly exists.

Jurisdiction Over Showtime May Be Asserted

In its **Petition to Deny**, SPACE maintained that Showtime's use of facilities amounted in many ways to a resale common carrier offering. Teleprompter responds to this assertion by quoting the definition contained in **Resale and Shared Use of Common Carrier Services**, 60 FCC 2d 261, 271 (1976), reconsideration 62 FCC 2d 588 (1977), **aff'd sub nom. AT&T v. FCC**, 572 F. 2d 17 (2d Cir.), **cert. denied**, 439 U.S. 875 (1978). That decision defined resale as "an activity wherein one entity suscribes to the communications services and facilities of another entity and then reoffers communications services and facilities to the public...for profit." When Showtime subscribes to RCA's satellite facilities and then turns around and sells its services to any cable operator who pays for them, that service amounts to a resale offering. This aspect of Showtime's service would appear virtually identical to the service performed by Southern Satellite Systems. **See Southern Satellite Systems, Inc.** 62 FCC 2d 153 (1976).

Conservation Requires Maximum Utilization

Through its regulation of satellites, the Commission has maintained a firm policy of encouraging the broader use of such facilities an the expansion of services. It has sought to provide "diversified access to space segments." **DOMSAT**, 35 FCC 2d 844, 855 (1972). It has approved customer owned earth stations. **Cities Service Oil Company**, 51 FCC 2d 653 (1975). It has authorized the distribution of entertainment programming to members of the public served by cable television systems. **Southern Satellite Systems, Supra**. It has permitted the use of smaller, less expensive earth station receiving equipment, **American Broadcasting Company**, 62 FCC 2d 901 (1976), and fostered the provision of carrier provided earth stations on customer premises, **American Satellite Corporation,** 72 FCC 2d 750 (1979). It has approved the Public Broadcasting's use of such facilities, **Public Broadcasting Corporation**, 63 FCC 2d 707 (1977), 70 FCC 2d 1853 (1979), and deregulated receive-only earth stations. **Deregulation of Receive-Only Earth Station**, 74 FCC 2d 204 (1979).

Each of these decisions was premised upon the potential for satellite communications to reduce costs for communication services and thereby benefit the consumer. These decisions promoted the widest possible use of satellite communications to the point where there are thousands of satellite receivers presently in existence. **Authorization of New Domestic Satellites**, FCC 80-711 (released January 30, 1980). The great success of the Commission's efforts has resulted in a greater demand for satellite services than there is supply. This has resulted in Commission efforts to conserve spectrum allocations for the potential for future satellite communications.

> "It is imperative that orbital locations be conserved and not prematurely assigned." **Authorization of New Domestic Satellites, Supra**, page 23.

Precisely because there is such a shortage of satellite space, the Commission cannot continue to permit those who use it to, in effect, hoard this vital resource for anticompetitive reasons. The scarcity of this resource demands that the

Commission ensure that it be fully exploited. Such an objective can be fostered by denying the requested transfer or conditioning it upon a requirement to deal in the marketplace.

CONCLUSION

SPACE's opposition to this transfer is premised upon the concerted refusal to deal engaged in by Showtime and its owners. That refusal is being mirrored in the policy of HTN, 80% of which is owned by Westinghouse. This policy directly harms the membership of SPACE and the American public by denying them the opportunity to receive subscription services in a competitive marketplace. This policy has inured to the direct financial benefit of Teleprompter's cable television operations and it will likewise benefit Westinghouse by completely insulating their operations from a potentially competitive service...the only alternative source of multiple channel service available in the near future. If the Commission approves of the requested transfer without remedying this anticompetitve conduct, Westinghouse will continue the Teleprompter tradition of denying non-CATV earth station users access to programming. Such a result is unthinkable.

For the foregoing reasons SPACE respectfully requests that the Commission deny Teleprompter's requested transfers of control; or in the alternative specifically condition the transfers on a guaranteed right of access of non-CATV earth station operators and users to Showtime's domestic satellite programming at marketplace rates; or in the alternative, conduct a hearing to determine, in light of the foregoing, whether the proposed transfers would be in the public interest.

PROGRAMMING CORRESPONDENCE

HOMESAT with an R

My attention has been directed to your "Memo To Homesat Industry Suppliers" dated February 21, 1981 concerning SPTS '81. I am specifically concerned about your improper use of our trademark and service mark HOMESAT.

HOMESAT is a registered trademark of Scientific-Atlanta, Inc. for its satellite home television communications equipment. Therefore this mark must be used to identify only those products manufactured or distributed by Scientific-Atlanta, Inc. It should never be used to identify satellite communications products of any type which are not sponsored by Scientific-Atlanta, Inc. Your use of our trademark to identify a product not originating with our company can only be considered to be an improper use of our mark. Such use can be extremely damaging to the property rights of our company.

Peggy W. Jones
Asst. Corporate Secretary
Scientific-Atlanta, Inc.
Atlanta, Georgia 30348

OK everyone - S/A, while not actively engaged in the direct distribution of home satellite terminals, wants it known that HOMESAT should not be used by others when promoting or identifying products not of S/A manufacture or distribution. And should you write about "HOMESAT" terminals you must, at S/A's insistence, follow it with the universal copyright/trademark notation®. That suggest to others who have thought up clever names for their products or businesses that you should contact the U.S. Registrar of Copyright and Trademarks in Washington, D.C. asking for forms to register your own 'mark'. The fee is under $50 and it may prove to be the best 50 bucks you will spend if it keeps someone else from pirating your name.

CONFUSED ON ABACO

For about two years there has been a keen interest here in establishing a satellite earth receiving station. Scientific Atlanta made a proposal that they would provide four channels of programming for $180,000 before factoring in the import duty which is a hefty 54% here (!). Since this is a community of about 200 souls the proposal never got off the ground (so to speak). Scientific Atlanta said we need a 10 meter dish because of our location relative to the footprints of the satellites we wish to receive. Subsequent correspondence with the engineering division of Zenith Radio Corporation confirmed SA's proposal as pertains to the size of the dish required. This letter, quoted in part, said:

"Your location puts you into the fringe area of reception for current television satellites. That means you would be forced to use a large 7 or even 10 meter dish...'.

In the December **CSD** I read that Coop is bringing programming to an area that must be located either as poorly as we with regard to footprints, or worse. And he was doing this with an 11 foot dish!

The bottom line of all of this, simply stated, is that I am very confused. I realize that **CSD** may not be in a position to endorse a product; however, would it be asking too much to have you suggest to me what size dish is needed to provide a good picture, without the use of super-cooled LNAs. We have the STT plans for the Nelson 12 foot dish but are reluctant to launch into construction if our chances of success are so poor.

El Nettles
Cave Hill
Man O War Cay
Abaco, Bahamas

Ah yes, the sting of the SA quote sheet. We wonder how many hundreds of terminals have been put off for years because the would be user made the mistake of going to SA. Think of all of those people out there listening to static filled radio who now could be watching the TODAY program or ABC's WORLD NEWS TONIGHT with perfectly adequate private terminal hardware had they not stumbled into the SA trap! If you want perfect **pictures from WESTAR I and III and COMSTAR D2, a 13 foot dish with 85 degree LNA and Washburn or ICM 4300 or Vidiark** (etc.) **receiver will do the job. That assumes you get a good quality 13 foot dish and use a high efficiency feed. If you want the** whole world **of FI, a 16 foot dish with the same electronics will get you perfect pictures on all but perhaps transponders 21 and 10. With a ten meter dish you could see a fly crawl across the solar panel of D1!**

MUNTZ FEED

We met you at the San Jose SPTS and thought you might like to look at a new feed that has been designed by Muntz for optimum performance with .38 to .45 f/D dishes. The VSWR is 1.5 at 3.7 and 4.2 GHz and the feed will sell in the $95 range. We would appreciate any comments you might have.

Garry B. Blachley
Division Manager
Muntz Satellite TV
7700 Densmore Avenue
Van Nuys, CA 91406

We looked **at the feed. It is nicely constructed, heavy duty, and looks like a modified Chaparral 'Super Feed'. We have not yet tried it. Before we do, we would like to see some technical data on test range measured E and H plane beamwidths so we know what you expect out of it. Within the last sixty days several new feeds have come on the market. They all seem to look like the basic Chaparral unit introduced at San Jose last summer. Most are priced far lower than the Chaparral. If those responsible for these new feeds want to send a sample along to** CSD **we'll endeavor to hold a 'feed shoot out' and report to the industry** (wanna bet how many we **don't** get!).

FIRST IN MAINE?

My first earth station, consisting of a Sat-Tec R2A receiver and a polar mounted antenna from Gabriel Electronics, is just about together. The local people are as anxious as I am to see it work and we have a long list of people who want home demonstrations. I anticipate having a very good business here in Maine with this system, which may be the first in the state.

John D. McKinner
Home Satellite TV of Maine
Cape Elizabeth, ME 04107

You are probably not the first in Maine but certainly the first in Cape Elizabeth!

HARD TO FIND?

I read in a magazine several months ago about television satellites. I have been looking for your address since that time. And now I have finally found it. I am interested to learn more about television satellites and to collaborate on a commercial basis with firms in this field. I am interested in importing into Greece the necessary equipment for this reception which I would then distribute throughout the middle east and mediterrean countries. Please send to me the information and I will begin.

Tassos Hatzianestis
ANTELM
P. O. Box 1035
Thessaloniki, Greece

We feel certain that the suppliers reading this will send literature on to Greece. This chap is in the importing business there.

SUB-CARRIER/VIS SIGNALS

I would be very interested in articles on signal formats used for the various subcarrier services. Of special interest is the slow scan video formats in use on transponder 6 or the forthcoming Ted Turner super TV Guide to be distributed as a part of the vertical interval signal on transponder 14. I would like to be working on the hardware and software for decoding these services and know of course that it is already available commercially. There is no need to re-invent the wheel but I suspect that the same people who proved satellite terminals can cost less than $20,000 each can also develop more 'efficient' ways to decode these specialized format signals. Can anyone provide basic information so I have a starting place?

Ronald Waltner
353 N. Kenyon
Indianapolis, Indiana
46219

A number of different modulation formats are in use for 'encoding' of data such as digital news wire material, slow-scan television news photos and various audio services. The private terminal industry, to date, has shown little interest in any 'data' that cannot be 'seen' **in**

real time. Steve Gibson has worked from time to time on the decoding schemes required; we suspect others are doing so as well. CSD **would like to encourage people working in this area to share data** (such as through Waltner) **and we will of course eagerly look for data that can be published which will enlighten us all on this 'new' technology. To start things off, someone with a background in this area might prepare a "this-is-how-it-works" background article so that more of us at least understand what the basics are in this field.**

TOO MUCH ISLANDS?

While it is very interesting to read about Coop installing his system in the Caribbean I believe the articles are using up valuable space which could easily be used for information more closely related to satellites. It is not that it is not interesting...just not totally satellite oriented. I plan to build or buy a system very soon. I would like to see an article on some basics; what cables to use, what connectors to use, how to hook up the DC to the LNA, what is a DC block, how do you protect an LNA against lightning and so on. I recently contacted a dealer about his 'basic' system. This consisted of a Spherical antenna, Sat-Tec receiver and so on. His profit on the package was about $800 as closely as I could compute it. Then he asked an additional $450 for installation of the system; a total profit of $1250 on a $3000 item. I guess if you are a dealer that is a good deal but if you are a customer that is too much!

David E. Stoner
New Albany, Ohio 43054

It is with some trepidation each month that we take typewriter in hand to report on the progress of West Indies Video. Our reason for doing so is really quite simple; Coop's efforts in the Turks & Caicos is exactly the type of system thousands in the states will install in coming years, linking satellites and low power TV together. What he learns, by doing it first, is in a real sense a living document on what others can expect to encounter; the Caribbean flavor perhaps aside. If others feel that this on-going saga is a poor **use of valuable** CSD **space, let us hear from you. We'll cut it back immediately. If on the other hand you feel it should continue, let us hear that also.** As to the profit margin, **a 30/35% profit margin is not that outrageous when you consider the problems associated with this equipment and field at the moment. If you had somebody offer to install the complete system** including assembly and installation **of a Spherical for $450, that may be the bargain of the year. Believe us, $450 for installation represents very little 'profit' of such antenna system; those who have assembled a Spherical from a kit will we think agree!**

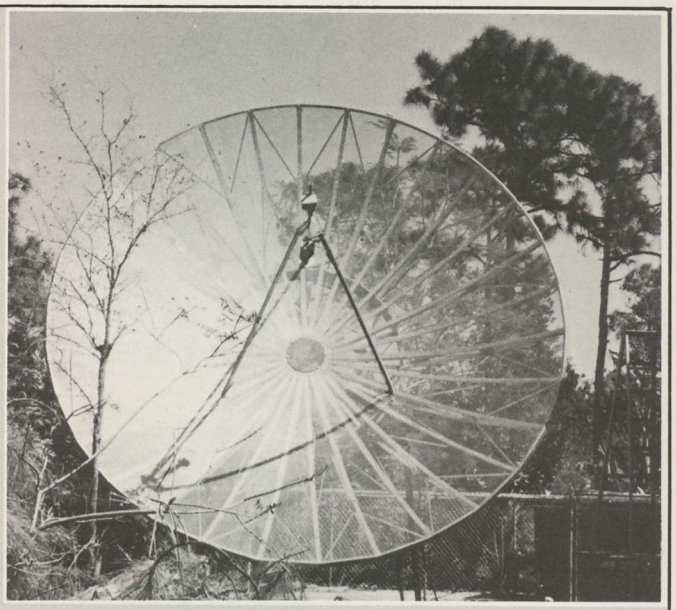
TV IN IXTAPALUCA?

Within the next few years I plan to retire to Mexico; Ixtapaluca to be exact. this is located 19°19' north and 98°53' west. What birds are likely to be available at this location and what type of equipment would I need for reception there? All of the footprint maps I have seen do not go that far south so I am unable to obtain an estimate of the numbers to use for system planning.

Glen Anderson
Mesquite, TX 75150

Perhaps the coverage of reception efforts to date in Central and South America, appearing in the April CSD, **helped. With the present birds a 5 meter dish plus 100 degree LNA and any of the present good crop of receivers should provide decent SATCOM reception. WESTAR would be a tad shakey. However by the time you move there we will have a new breed of SATCOM and WESTAR birds operating; with new antenna patterns and in the case of SATCOM some substantially increased power**

SIX METERS BIG . . .



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- **EASILY** shipped in spite of its impressive size. The entire package is so carefully designed and well thought out that it ships and goes together with the precision of a fine instrument.
- **SMOOTH** operation. Touch the motor drive switch and watch the transponders zip by; from F1 on the west all the way to the INTELSAT and GHORIZONT signals in the far eastern sky in just sixty seconds time!
- **HERO COMMUNICATIONS is now accepting applications for new dealers.** We offer the world's finest six meter antenna system (5 meters also) direct from the manufacturer. Our experience in solving tough installation problems will save you money and time in completing your own installations. We offer sound technical backup based upon years of experience in this field.
- **PLUS** - from HERO COMMUNICATIONS you deal with a warehousing distributor for WASHBURN, AVCOM, and ICM receivers, a complete line of accessories including ½ inch hardline, connectors, modulators AND the fantastic 85 and 100 degree DEXCEL LNAs. We manufacture and handle nothing but the field-proven-best equipment in the industry today. Whether you need a single connector or a complete system, HERO COMMUNICATIONS is here to serve you.

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levels. The game will change, in your favor, by 1983 or so. How much improvement is ahead you will have to wait, with the rest of us, to see.

THE GAP NARROWS

We recently did a demonstration for Reuters news at White Plains, New York using our 13 foot trailer transportable rig for the ACLI Corporation. Ron Owens was on hand from Reuters with their fancy decoder for the transponder 18 data that we all see during the daytime. A study had been made at that location, by computer, and it had been decided that terrestrial interference would make the site unusable. Ron Owens also told everyone in advance that the AVCOM receiver, which we were demonstrating, was a 'piece of junk' when it was compared to the Scientific Atlanta receiver which he brought along. Well...we not only produced flawless video pictures from the 13 foot antenna but on close inspection they found the AVCOM receiver produced precisely the same errors/packet/second of Reuters data as did the SA receiver! Ron Owens, after witnessing this, remarked that he wouldnever say that about an AVCOM receiver again. This also once again proves that while computer surveys are fine if you **really** want to know if a system will function at a given location, the only good way to reach a conclusion is to go there and set a terminal up.

Paul Helfer
Helfer's Antenna Service
New York

We recently had the opportunity to test, elaborately, a pair of fresh, factory sealed $5,000 satellite TVRO receiver widely sold in the 'commercial' field. They tout their 'digital demod' system which they claim produces threshold extension that is state of the art. The color fidelity was excellent..if you could see the picture through the sparklies! **Overall picture quality on both was worse than a Sat-Tec, several ICMs, several Washburns, the new Vidiark...in fact it was the worst** (i.e. most noise) **picture in the place. The shame of all of this is that firms that produce this supposed high quality gear certainly have the engineering talent and dollars available to build a** 'state of the art', **sensitive receiver. They get high marks only for** 'studio color'; **but they fall way down on sensitivity. Worst of all, they design commercial systems for monied customers built upon their own system sensitivities and this causes the commercial customer to end up with a 16 foot antenna while right next door a 'little' guy with a cheap receiver is getting the same video signal to noise on a 12 or even 10 foot job. The low cost terminal industry may not be perfect, but we are at least doing something correct!**

AIMING THE MOUNT

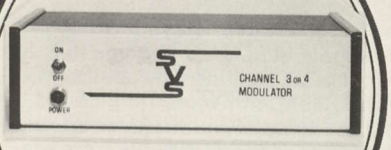
We have been in the TVRO business since SBOC Houston and we did have some problems getting started. Our main problem arose with alignment of the polar mount. There is very little written about the mount; even the '**Gibson Navigator Manual**' deals primarily with teh Az-EL mount. I, and my partners, are perfectionists in everything that we do and we therefore worked on reducing this unknown to a known. We have a solution and would like to publish it in **CSD**, so that others might benefit from our research. The math involved is difficult however and many readers may not understand it. We therefore propose to offer a computer service for those willing to pay a $10 fee.

Stephen Kalorplos
Satellite Television Systems of S.C.
114 Beverly Drive
Seneca, SC 29678

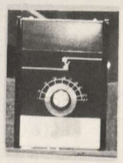
Send the material along and we will be happy to

RECEIVER

K_L-1000



OPTION 1



OPTION 2

OPTION 3

1 MODULATOR
2 REMOTE
3 STEREO TUNER

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THE LEADER IN

SATELLITE VIDEO SYSTEMS

consider it for publication. Sharing material is what CSD **is all about.**

AMERICAN TV IN LEBANON?

I read about your home satellite receiving system in a September issue of **PARADE** Magazine. Would an antenna such as this provide direct reception in Beirut, Lebanon of US television programming?

T. F. Barron
Administrative Counselor
(US) Department of State
Beirut

American television transmitted overseas via INTELSAT satellites is scarce. Most of it is sent in the form of news field briefs on a semi non-scheduled basis from New York or other major US cities to their counterpart offices in Europe, Asia and so on. This is done using INTELSAT GLOBAL beam transmission; signals far too weak for reception on any but the larger 30' plus antenna systems.

WEST INDIES VIDEO REPORT (Part VI)

TAKING A DEEP BREATH

The master plan to bring live, local plus satellite fed television to all of the populated islands of the Turks and Caicos has undergone several substantial changes since we landed here last August. Our original concept was to provide television only to the western most islands since Grand Turk and Salt Cay already have a service of a sort through a local 5 watt transmitter fed by week or two week delayed videotapes from the states. We didn't come down here to establish a 'media empire' (that's a joke when you consider the going in expense versus the ultimate size of the marketplace!) and actually were talked into **sharing** our television with residents of Provo only after the local Planning Board noted on my property plans something strange marked 'Satellite TV Antenna'.

From that revelation ("You mean you will have live television from the states!!!") came some subtle local pressures and insistence that we 'share it'. Having agreed to do this with Provo, then the rest of the islands got into the act. We ended up with a master license for all of the islands because we were led to believe that we would get along much better down here as 'permanent residents' if we agreed to share.

Before selecting channel 4 for Provo coverage I spent several weeks observing the off-air signals that jumped in and out of the airwaves in the area. There are no accurate reference books that correctly tell you where all of the TV transmitters are in Cuba, for example, and while it is 250 or more miles away on the average their signals come across the quiet waters with good strength and great regularity. I did not want to be selecting a channel where a Cuba, Haiti, Dominican Republic or other station would be 'tearing us up' with interference.

There are a lot of sound arguments for staying **off of the low band** (2 through 6) channels in an area such as this. In addition to the not so freak reception of nearby islands you also have the summertime problem with something called E skip; a strange layering that infects the E layer of the ionosphere and when it happens it sends signals from stations 500 to 1 500 miles away pouring into your area. This may happen for a few minutes per day in the summertime or in a bad situation in June or July it may last for days. Against this problem I had to weigh the problem of interconnecting my translator transmitters over a chain of islands. **At one point** I thought I would use **UHF TV to interconnect** the various islands together and then use high band VHF (7 through 13) for island coverage. I've had a fair amount of experience with UHF and knew that this would require several times as much maintenance and going in costs. Still, I wanted to do it right. After a talk with Keith Anderson at Anderson Scientific I decided UHF was still not right for me. Keith makes some five and ten watt **UHF** translators which like the VHF units are energy efficient and not terribly high priced (although 25% more than the VHF units), and on the surface they seemed like the proper choice. The more we talked about it however the more concerned I became with maintenance. That left me back on the drawing boards planning how to inter-connect the islands. The inter-connection problem comes first since if you can't get the signal **to** an island you don't have to worry about re-broadcasting it anyhow.

I think of the inter-connection system the way cable people think about their 'trunk' line; that is, a 'pure, as close to perfect' set of picture and sound as can be created within the constraints of a real world budget. With UHF out, high band VHF was the next choice. Sicne the ten watt power level is about all you can manage with reasonably priced solid state translator-transmitters the 'ERP' equations have to be 'solved' with antenna gain. ERP is **effective radiated power**; you take ten watts from a translator and connect it to an antenna with 10 dB of directional gain and your ERP is now 80 watts. Or increase the size of the transmitting antenna to two yagi antennas and now you should have around 13 dB of gain and an ERP of 160 watts. You can play this antenna size game for quite a ways before you run into electrical problems; you'll probably have mechanical problems keeping the antenna array in the air before you have electrical problems.

And on the receiving end you reverse the procedure. If you have a need for 16 dB of antenna gain you stack four of the 10 dB gain yagis and hope it turns out the way the book says it should. If you are only interested in getting from point 'A' to point 'B' you can forget about serving any people with the system and rotate the transmitting and receiving antennas to the side; **vertical polarization**. This places you cross-polarized to any regular TV broadcast signals that may be in the area and this additional 'isolation' cuts down on potential interference to your 'trunk' signal. Two (or more) TV signals coming into the same receiving antenna on the same channel

at the same time makes for a nasty looking picture.

So it looked like the best approach for interconnection would be to use vertically polarized high band channels. But there is one more consideration. The translator input and output conversions.

A translator works by picking up one channel and changing that channel to a new channel for rebroadcast. It is possible, on paper, to convert virtually any input channel to any output channel. However, the cleanest conversions (meaning those best to make and least expensive to make) are from low band (any channel 2-6) to high band (any channel 7-13); or vice versa. Going from 7 to 13 is possible but dangerous; going from 7 to 8 is almost impossible and in the best case expensive.

So you want, in our case, to go from island to island on high band and then on each island serve the folks on low band. Furthermore if you are going to be constucting quite a chain of these things there are other considerations.

1) **VHF translators** (or UHF) **do not operate perfectly**. When they convert an incoming channel to an outgoing channel certain things are done to the television signal. It is amplified, converted...and unfortunately, slightly distorted in the process. This distortion occurs first to the all-important sync signals; they compress or fold over just a tad. When you go through a string of translators this sync distortion becomes cumulative. You can see it on a **waveform** monitor after **one** translator; you can see it on a **TV set** after **two** translators and after three translators you will probably be on the ragged edge of having sync that TV sets will accept. In effect you are (accidentally) 'scrambling' the video.

This obviously must be compensated for; somehow. Since we will be going through at least **five** transmitters before people at the end of the line get our signal, we have to design into the system some compensation. You do this by going in at the third receiving site and reducing the received signal to baseband video (and audio). Recall that up to this point the signal has stayed at RF all of the way. Once at baseband you can run the video back through some signal processing equipment to re-establish the proper sync waveforms. Having done this you can then go on again.

Then there is the number problem. If you go from 'A' to 'B' on high band, serve 'B' on low band, how do you get from 'B' to 'C' on high band? Remember that a high band to high band conversion is not desirable. The answer is that you don't; you go back to low band but you select your channel **very** carefully.

NOW - when you scramble the service, as we are doing with the BTVision system, you have yet one more 'problem'. Since the descramblers operate on a decicated channel you would like for inventory and maintenance reasons to keep all of your output channels on a single channel. It would not do to have to stock descramblers for channels 2, 4 and 6 for example when you are only using a few hundred of each. No matter how carefully you plan, you'll end up with too many of one and too few of the others. And since the supply lines are so long and getting stuff in here is such a hassle this is something you want to avoid if at all possible.

FINALLY there is the matter of obtaining line of sight transmission between each of the sites. Remember the tallest spot in any of our islands is just barely over 150 feet (above the sea) so you don't have much to work with unless you build some pretty stout towers. That is also something to be avoided since salt humidity corrodes everything it touches; including galvanized towers. Replacing towers or masts or clamps every six months is not my idea of fun. The little bit of elevation that is available is largely in undeveloped portions of the islands. People built their villages down here close to the sea since the sea provided them with transportation and food. The land near the sea is low; the land 'in-land' may rise a bit. That says you have no power or roads to the elevated sites; such as their elevation may be.

Some place along about here you will pardon me if I wonder aloud how I got talked into this whole deal. All we wanted was government permission to locate next to our house and TV production studio **a simple 16 foot satellite antenna**. I should have called it a 'solar collector' or 'solar cooker' and then sworn my family and friends to secrecy!

The Real World

Between the first of January, when we switched to the Blue Mountain translator site and the first of April we lost only 30 minutes of air time because of our own equipment failure. We also probably lost another six hours because of the local electrical supply. That is a pretty fair record considering we are on the air 24 hours per day. That kind of 'massive amount of television' has brought some significant changes to life styles on Provo. They tell me virtually everyone stays home at night now. Television hasn't replaced social activities but it has eliminated people going out of the house because they need a change of scenery. On Saturday and Sunday evening at 6 PM you won't find **anyone** driving around or in the shops. **The whole island stops living for an hour or two** while they watch TV wrestling. The next day the wrestling matches are on everyone's tongues as they relive take downs and snap mares and the whole nine yards of this 'super sport.'

Since Provo residents travel back and forth to the other islands the 'pride' local residents feel for their TV has spread rapidly. And we have been feeling the pressure. One day early in March a delegation from North Caicos came to see me. They wanted to get a definite date when they could have TV. Since I had enough equipment on hand to get them TV that seemed like a fair request. The next day one of the North Caicos residents came over in his small Cessna 170 and we loaded up a battery operated TV set, a field strength meter, a channel 4 yagi and some support equipment and headed to North Caicos. Across the plastic windshield we taped a dipole cut for channel 4 and I measured the WIV Signal on the field

strength meter as we flew along 100 feet above the ocean. At about 12 miles out I lost the signal in the ignition noise of the 170. Before we landed at North Caicos we made several passes over some ridges I had previously spotted on a topographical map and I tried to find the 20-22 mile distant signal on the field strength meter. When the signal is buried in the noise that way it is sometimes difficult to tell what you are reading so after 30 minutes of this we landed and commandeered a pickup truck to head into the bush. After some set-up-the-antenna and take-it-down exercises I found a weak but stable signal on a ridge 20.2 miles from our transmitter. I measured it at -29 dBmV (not much) at 10 feet off the ground. **It looked clean anyhow.**

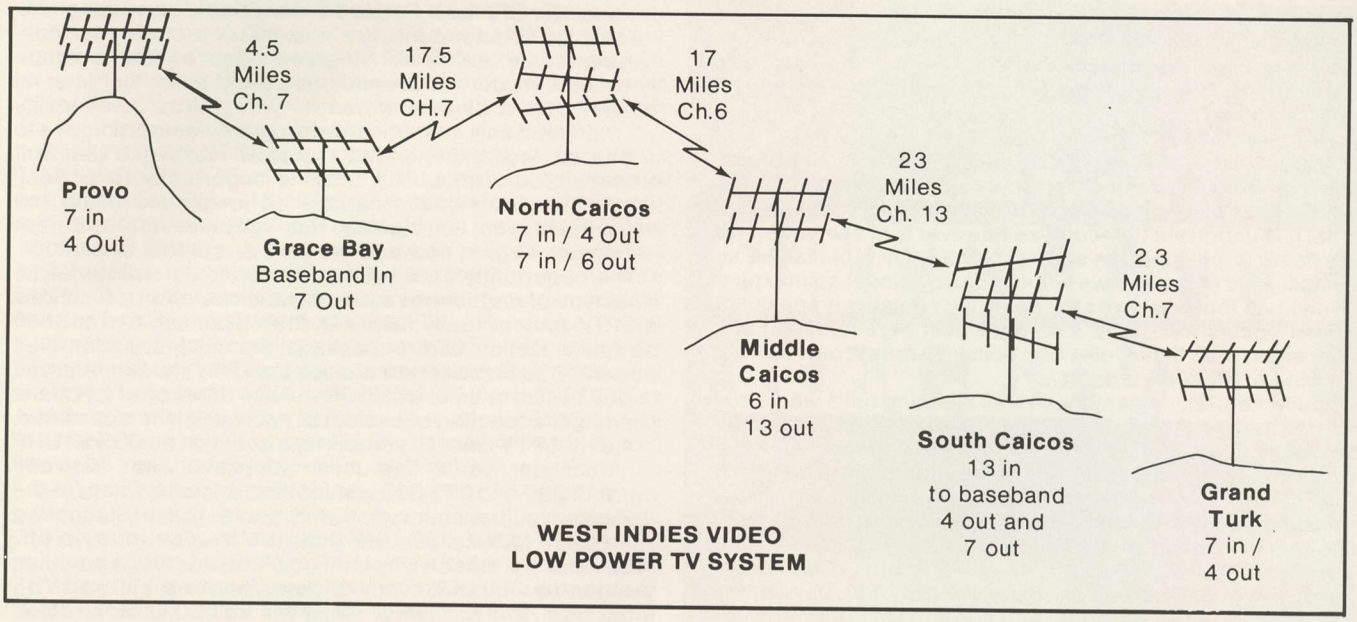
Then we packed up and called a 'town' (island would be more descriptive) meeting. Several dozen people volunteered to build a road and clear a site about ½ acre in size. The one thing I did not have available was a steel tower to spare. They said **they would build** a four sided wooden tower - 40 feet if I needed it that high - out of 2 x 4's, 2 x 6's and 2 x 8's. The island's largest builder said he would bring in a D8 cat and clear the land. We were in business.

Arriving back on Provo I ran into one of the upper government officials at the Provo airport. I reported what we were up to and told him of a rumor I had heard on North Caicos about the government having a pair of 40 foot utility poles laying at the dock there. Two hours later I had permission from the head of government himself to 'confiscate' the poles for our antenna support structure. That weekend the North Caicos group, following some sketches I drew on a napkin at the hotel bar, cleared the land, built a road, dug the holes and manhandled the two 900 pound utility poles into the ground, poured some concrete and built some cross members between the poles to support the antennas.

Eight days after the initial signal survey I returned in the 170; loaded this time with a pair of channel 9 yagis, 100 feet of .412 aluminum jacketed cable, test equipment, tools, the translator and a pair of heavy duty 12 volt batteries to run the translator. We started working at 11 AM with a sizeable volunteer crew and by 2 PM we were watching Provo television. By 3:30 PM we were re-broadcasting Provo's channel 4 via a temporary channel 9 translator for North Caicos.

Now this is not how we are going to do it when the full system is operational. Recall that we go from our Grace Bay site to our Blue Mountain site on channel 7 using a one watt amplifier that follows our Blonder Tongue TVM-7 modulator. I could have gone into a regular translator to cover our island on channel 4. But remember that after you reach a point of having 'translated' the signal three times or so the sync starts to get pretty ragged. So Keith Anderson had suggested to me that I **skip the translator at Grace Bay** and simply directly drive a solid state 1 watt amplifier there. That makes the Blue Mountain unit the first (**conversion**) translator that processes the signal. That means that when we go through the channel 4 in / 9 out unit on North Caicos we are now '2 deep' in translators. Since the next site on Middle Caicos is going to be strictly a relay site (virtually nobody will have TV there soon) I was faced with having to go back to baseband and reprocess the signal **on Middle Caicos**. This is very undesirable (see map) since Middle Caicos is the most difficult to get to and the site there can be inaccessible part of the year. This site, of all of the sites, has to be as 'simple' and as foolproof as possible. Obviously I was going to have to get to North Caicos so that I would be only '1 deep' in translators at that point. This said that I had to get there directly from Grace Bay, from the studio, without going through the Blue Mountain 7 in and 4 out unit.

Getting them TV (4 in / 9 out) was a temporary solution. It allowed us to get TV onto the island and it showed good faith on our part. It also got the site developed with a bunch of volunteer people and equipment; a not insignificant savings. They got TV several months early and free at that since we won't start scrambling until after we convert them over to



WEST INDIES VIDEO
LOW POWER TV SYSTEM

channel 4 local output.

Which brings us to getting all of this hooked together.

1)**At Grace Bay** a ten watt amplifier will be driven by the TVM-7 modulator. Through a directional coupler we'll take 1/10th of the watts available at the end of the transmission line and send it on to Blue Mountain via a pair of channel 7 yagis. That will give us just about the same signal up there as we now have by driving the antennas with a 1 watt amplifier.

2)**The other** (through) **port** on the directional coupler will feed the remaining 9/10ths of the watts available to a **four stack** channel 7 antenna array pointed at North Caicos. The path will be just under 17.5 miles and barely line of sight with the Grace Bay antennas 70 feet above sea level.

3)**On North Caicos** we'll take in channel 7 with an **eight bay** array of channel 7 yagis, around 130 feet above the sea. This will feed another 7 in / 4 out translator which will serve North Caicos thorugh a pair of channel 4 yagis 'skewed' to cover the three towns there.

Also on North Caicos we'll take the **same** channel 7 signal and in a **separate** translator convert it to channel 6. This signal (ten watts on channel six) will drive a 4 bay array of verticlaly mounted channel 6 yagis. They will be directed at a site some 17+ miles away on Middle Caicos. We have good line of sight here because the Middle Caicos location is only feet shorter than our Blue Mountain on Provo.

4)**On Middle Caicos** we will convert channel 6 to 13 in a translator (**now** we are 2 deep) and receive the North Caicos channel 6 relay with a 4 bay array of yagis. To go onto South Caicos we'll feed an eight bay array of channel 13 yagis. This is our longest path; nearly 23 miles. But it is line of sight with a 100 foot elevation (plus tower height) on the South Caicos end.

South Caicos is a terminus and processing point. Getting in and out, and around while there, is much like Provo; i.e. when there is gasoline you have no problems. There are also several hundred potential TV viewing homes here. We'll take the channel 13 signal **from Middle Caicos** and demodulation it to baseband video and audio. Then we'll process the video clamping the sync and creating new sync if required. Now we will be at baseband here so to go on we'll go back into a channel 4 modulator (to serve South Caicos) and into a channel 7 modulator. The channel 7 modulator will feed a ten watt amplifier that will in turn feed a four bay stacked antenna array directed at Grand Turk. Local service on South Caicos will be through another ten watt channel 4 amplifier.

5)**Finally over on Grand Turk** we've selected a transmitting site from atop a 100 foot - plus former US Navy base water tower. The tower will hold a quad stack of channel 7 vertically polarized yagis and a pair of channel 4 yagis. The translator will be in a metal box at the top of the water tower although the electrical supply lines will come down the water tower leg to a small battery / solar power housing box at the base (at ground level).

In this way we will be serving Provo, North Caicos, South Caicos and Grand Turk / Salt Cay **on channel 4**. That means our descrambler gear can **all** be for that channel. Middle Caicos may take a few years to develop but when it does we'll also feed it on channel 4 by demodulating the channel 6 signal relayed from North Caicos, re-applying it to a modulator on channel 4 there and then driving a ten watt amplifier on channel 4.

Standing By

Because we are virtually at the end of the supply line down here you have to be prepared for whatever might happen to you. Some things you can repair; others require a (long) turn around cycle to go back to the states for repair. This says that anything crucial, for which there is no 'jury-rig backup', has got to have a direct replacement sitting on the shelf.

You'll note that we have redundant gear throughout the system. There is a 7 in / 4 out translator on North Caicos, on Providenciales and on Grand Turk. **One spare** of this box ought to handle that problem. We are modulating on channel 7 on Providenciales and since this is where **everything** starts from we'll need a spare modulator there; and it will back up South Caicos. On South Caicos and later on Middle Caicos we will be modulating on channel 4 so a single standby will do for this pair of islands. The 7 in / 6 out (North Caicos) and 6 in / 13 out translators on North and Middle Caicos will need their own dedicated spares. We'll keep a spare ten watt amplifier for channel 7 on Providenciales and that will double for South Caicos.

Amazing Technology

Those who attended the SPTS '81 in Washington this past month already have in their possession a copy of our new STT **'Low Power TV Handbook'**, co-authored by S.P.A.C.E. General Counsel Rick Brown and myself. It preaches that a person with a desire to serve a local area can do so with a

combination TVRO terminal and ten watt **VHF** translator transmitter for **under $7,000**; the whole package total. What we are gradually accomplishing down here in the Turks and Caicos Islands is of course proof that what the Handbook says is correct.

The blend of two state of the art technologies, low cost satellite TV and low cost low power (VHF at least) TV broadcasting offers an exciting new opportunity for people to have quality television in many regions of the world for the very first time. It is important to recognize however that everything we are doing is 'pushing' the state of technology. Not that it is so complicated (if it were, we would not be doing it so inexpensively); just that when we start doing it for (relatively speaking) so few dollars we stir up a hornet's nest of resentment and opposition from those folks who believe it **must** cost more **if** it is going to be done properly.

I quite naturally resent those well meaning folks who insist that you can't do what we are doing for a few thousand dollars an island and still do it properly. My answer simply is "**see it...then you'll believe it**', and more important, "**if we did it the** established **way it would** never get done **since the cost of doing it the established way far exceeds the ability of the folks here to pay for the service.**"

And that is kind of the bottom line to this project and what I believe will be hundreds of others like it starting up over the next year. When established methods don't fit the criteria you are forced to operate under, you find new ways to accomplish the same thing.

Since this is not yet a mature evolution there are many-many gapping holes in the **supply end** of the technology. I know that many would-be entrepreneurs are out ther reading this who are looking for ideas for new products which they can design or market or invest money in. I'd like to leave you with a few first hand observations on what is needed to make this a more mature field.

1)**VHF Translators** - Investing around $2,000 for a ten watt output VHF translator is fairly cost effective. The only unit I know of that meets **my** standards for good construction, conservatively rated parts and reasonably good workmanship is put out by Keith Anderson at Anderson Scientific (Black Hawk, SD). This product is still hand made in small quantities. I know that Keith (and I assume others also)is thinking hard about upgrading to production program turning out perhaps 100 a month. Keith wants to see the market develop before he does this. I am not sure we can wait for that; I believe the market is there (**now**) if somebody will jump in and do it.

As a ham radio enthusiast I look at the TVT-10 and I see around $900 to $1,000 **retail** price for this same box being built in any kind of quantity. **Keith is not high priced** when you consider he **hand wires** each one. The product is over priced however if somebody sat down to do it in a real assembly line environment. If the Japanese ever got interested in this market they'd come back with a ten watt unit that would accept a direct satellite input; i.e. switch selection of a 3.7 to 4.2 GHz input channel and switch selection of a VHF TV channel (NTSC format) output; ten watts.

There is a design and production challenge here and I am convinced the market for these, world wide, would exceed 2,500 the first year and 5,000 the second year. If they were cheap enough I'd put two or five or even 12 channels of TV into my islands. So the market would not fill up for quite some time. Anyone listening?

2)**Modulator/Transmitters** - You can buy today (as we have done) $800-$1,000 each CATV grade modulators and then you can tack on an outboard ten watt amplifier. When you get all done you have about as much money invested as you do with a standard ten watt (Anderson) VHF in / VHF out translator. This is another area where a cost effective combination package needs to be brought to the marketplace. What would a fair price be? Not over $1200-$1300.

3)**Control Package** - We spend a fair amount of space in the new STT '**Low Power TV Handbook**' discussing how you go about producing a reasonably professional looking 'on-air-look' by marrying local video to satellite or tape video. To do this properly you need a vertical interval switcher, a 'station reference sync' source, some ability with read only memories and programmable memories to select locally generated videotext messages that suit what you want to say, and the opportunity to 'correct' input video signals that are no longer exhibiting the proper sync waveforms. This takes several different pieces of gear now and the cost is upwards of $4,000.

The opportunity here is for someone to carefully analyze what type of real control, switching and operational functions a LPTV system really needs at their disposal; and to then design a station control package around those identified needs. In the present marketplace the LPTV planner is forced to buy descrete units which often have duplicated functions just to get a function or two out of each which he does need.

4)**UHF LPTV Gear** - If you ask for a quote on a 100 watt UHF translator you'll find most suppliers want between $12,000 and $22,000 just for the translator. Then for the antenna (transmitting) they'll quote you a staggering $5,000 to $15,000. **UHF gear is a tremendous rip-off. There is no reason** why UHF gear should carry a premium **greater than** 10-20% over VHF gear. There are 100 watt VHF amplifiers on the market for under $5,000; all solid state. They too are overpriced but charging more than 4 times as much for the same unit just because it operates on an UHF channel is an insult to intelligence.

The UHF market is monied (reference the VHF market). Virtually all of the applicants for the new 100 watt UHF LPTV stations list going in expenses in excess of $50,000, and $60,000 is not uncommon. These 3800 or so applicants can be excused for anticipating such expenditures simply because they don't know any better and today have no viable lower cost alternatives. If the FCC received around 3800 **UHF** LPTV applications in 90 days when stations cost upward of $50,000 can you imagine **how many more** they would have received if the equipment for the station were priced more realistically; say $15,000 tops for a 100 watt system!

YES - the new LPTV plus satellite marriage is going to keep a lot of equipment designers and would-be equipment designers very busy for several years. It will take six months or more for much of this new hardware to be finalized and before we start hearing about it. And then it will be another six months before we see it actually be shipped. It will be a long but eventful year as all of this develops on a path parallel to the ongoing development of low cost satellite TV terminal hardware. We'll let you know from time to time how our own project is working out; be sure to let us know about yours as well!

BIRD OPERATIONAL NOTES

RUMORS persist that RCA's **FIII-R bird**, scheduled for late June launch and September operational date, **may be post-**

poned. Sources at RCA indicate that testing of apogee kick motor (it failed with FIII bird in December 1979) has gone badly leading to speculation that FIII-R may not now launch until August or September. Slippage of launch date will push operational date for III-R back into November (earliest) time frame. FIV is scheduled to launch shortly thereafter.

ON APRIL 8th FCC put 'hold' on acceptance on any further LPTV applications. Commission said applications had risen to in excess of 5,000 and they feared that number would double within another month. Under decision you may**not** file a new application **unless** you are applying to provide translator/ LPTV service into an area that has no more than one fulltime service presently available, or you are making minor modifications in existing translator systems. FCC estimates of 5,000 plus present applications perhaps 1,00 have asked for channels which nobody else has requested. **Only those** will be acted upon **before** FCC considers final form of LPTV rules which at earliest will be 'fall'. Balance of applications, on channels sought by two or more applicants, will stay in hold file or be returned to applicants until 'fall' ruling.

Impact of decision is considerable. FCC simply created a monster' it could not control and its only way out was to stop process. For those with **truly rural areas** to serve, 'freeze' may be blessing since now FCC staff will be able to **concentrate on** these unduplicated applications. Those applications, filed before April 10, which are **un**contested but seek to provide LPTV servie in areas with **more than one** fulltime service will be returned to applicants.

BIRD MOVIES - ANIK A-2 has been moved from 107 degrees **to 114 degrees** to 'share' that spot with ANIK A-3. Both of the 12 transponder birds have been 'ailing' after prolonged use and will fly as a pair sharing transponder services until replacements can be launched. ANIK B at 109 degrees continues to have the greatest amount of TV activity (5 or more TV transponders). COMSTAR D4 is parked at 127 degrees after successful launch in February. D1 at 128 degrees will be co-sited with D2 at 95 degrees in a similar 'paired' arrangement, although D2 will carry most of the load.

GOOD NEWS may be 'just over the horizon' as the launch of SATCOM FIII (R) - the replacement for FIII lost in December of 1979 - promises to bring increased signal levels on most transponders with higher power output (8.5 watts versus present 5 watts) on many transponders, and, re-directed boresight which RCA expects to aid systems located in southeastern portion of USA. Additionally, location at 132 degrees (at least for now) will produce high look angles throughout east and every little bit will help. **CSD** will have an extensive report on what to expect in our **July** issue.

Home Theatre Network (HTN) on transponder 21 Monday-Saturday (8PM to 10PM) is expanding schedule. With Westinghouse money HTN attempting to acquire full use of transponder 21, will expand former 'mini-pay' schedule to 7 PM - midnight.

Six hour per day 'health care channel', put together by NBC/ABC 'star' Dr. Art Ulene, scheduled for January 1st start 6 hours per day (noon to 6 PM EST). Service has contracted for space on WESTAR III, opts to get space on SATCOM and with daytime schedule may find room after FIII-R 'smoke' clears.

LOOK FOR hearings in Senate on DBS issue later this year. Under Senator Goldwater, who has extensive communications background, Senate appears to be headed for more active role in communications planning in early 80's.

SPACE SHUTTLE shot did provide many in Caribbean and South America with first opportunity to test out recently installed systems on **international** event. Early reports indicate COMSTAR D2, using transponder 12 boresighted on Puerto Rico, provided high quality service to points in Venezuela, Columbia as well as closer in on antennas as small as 14 feet. This indicates transponders 4,8,12,16,20 and 24 are **presently** boresighted on San Juan.

Transmission of specialized video data to selected audi-

ences gaining foothold in eyes of telecommunications planners. Success of Blairsat system (Westar I) to distribute TV commercials via bird rather than via tape is encouraging others to look at ways to use trailer transported terminals for on-site display of seminars, conventions and sales presentations. Watch this area for exciting developments for TVRO dealers in the balance of this year.

DBS service for Europe may start as early as late 1983 with LUXSAT (DBS project of Radio Luxembourg) likely to have programming 'in air' by then. Advertiser supported programs (closely controlled in most of Europe) would cover Germany, Holland, France as well as Luxembourg.

MEANWHILE United Nations are holding month long talks in Geneva, Switzerland aimed at answering question "Should DBS signals cross borders **without** consent of nations involved." Moot point perhaps.

THOSE who knew where to look, or have motor driven terminals available, were treated to 'insider views' of launch of US SPACE SHUTTLE April 10th and after. Extensive use of WESTAR 111 (TR 11) and SATCOM F1 (TR 13 with NASA direct feed at reduced footprint level) held observers spellbound with views not seen on commercial TV coverage.

OTHERS who didn't know where to look were 'treated' to RCA provided service carried on TR11. This 'free' service was given to cable systems to use as they wished, began shortly after midnight and ran through California landing April 12th on intermittent basis.

MAJOR motion picture studios withholding movie product from The Movie Channel, SHOWTIME and HBO for nearly a year is having its fallout. During 'Premiere' battle, four major studios kept recent releases out of pay-TV offerings hoping to use product themselves on Premiere. With that service all but dead The Movie Channel was first to get back on band wagon with newer releases. HBO and SHOWTIME, meanwhile, have been digging to bottom of barrel looking for oldies-but-goodies and producing more of their own material.

SPACE VICTORY with SHOWTIME (see report this issue on SPACE filing with FCC) was announced 'quietly' at SPTS '81 Washington. Under new agreement engineered by SPACE's Brown and Howard, SHOWTIME will offer programming to apartment, condo stand-alone TVRO systems and under special circumstances to private home terminals. A full report in the June **CSD**.

INTELSAT V 12 GHz capabilities were demonstrated with two-way video link between Maryland and Genoa, Italy late in March. First V vehicle is having problems; solar panel that tracks sun is moving slower than sun.Next V launch, scheduled for this month, may slip to June as result. Similar problem occurred with US F2 bird and has plagued use of bird since it went into orbit.

FRANCE, ENGLAND and now Italy will be using US satellites to spread 'national TV' to American (cable) TV viewers. Studio I(taly) using WESTAR 3, transponder 9 will be up and active starting on May 2nd with Italian television for the nation's estimated 20 plus million Italian-Americans.

UPDATE on DBS battles for US; broadcasters now believe their best chance to slow down DBS at 12 GHz here is to focus on the 'wasteful nature of DBS spectrum allocations' rather than technical or legal issues. Meanwhile there are signs - weak but unmistakeable - that Reagan administration is vitally interested in, and supportive of, DBS proposal. Possibility - President may even openly endorse concept. HBO meanwhile has come out 'for' DBS but asks FCC to insure that signal pirates are subject to 605 regulations.

STV stations may be forming alliance to locate and share an annual schedule of sporting events which would be distributed via satellite to perhaps 12 to 15 STV outlets across country.

MORE Soviet birds up there. Latest **Molniya** (inclined orbit) bird became operational around middle of April after March 24 launch while new Ghorizont bird that may (that's a maybe) end up at 25 degrees west was being tested at 14 west early in April. Russian use of Ghorizont 2 (14 west) which **was used extensively** during summer Olympics (see **CSD** for September 1980) has been toned down of late with typically only two video transponders active. Some observers report English language 'newsfeeds' on this Ghorizont around 5 PM eastern time of late, apparently Russia's answer to INTELSAT transponder leasing.

SBS bird due to start service first week in May (12 GHz) after successful tests this spring. IBM will be first regular or routine user.

This is month (starting around 18th) when NBC will begin feeding **large** portion of its regular network schedule to Houston and Chicago via COMSTAR. D2 bird is likely bird for service which NBC and AT&T characterize as 'operational test'. To this point nothing approaching full network schedule has been available on a satellite.

ARTS - the first ABC (and US network backed) cable TV service kicked off on schedule April 12th at 10 PM eastern. Using Nickelodeon's transponder 1, immediately after NICK signs off for the night, ARTS brings 'culture' to the bird on a regular basis. CBS kicks of its competitive service on June first.

SMN (Satellite Music Network) is the latest 'format' to be announced; a **pair** of audio signals sandwiched into the already busy transponder 3 (F1) subcarriers, SMN will provide 24 hour per day country and western, and, adult programming music to radio stations and others. WFMT and an instrumental background service are presently on TR3 subcarriers. An August 1st start date is forecast. Customers will be radio stations throughout country; the ultimate automation package wherein the local station need only have the capacity to drop in seven local commercials per hour!

NOTE: The SPTS '81 Washington wrap up dates were too close to the final deadlines for this issue of **CSD** to provide coverage here. The June issue will contain full coverage of the event. See you in Omaha!

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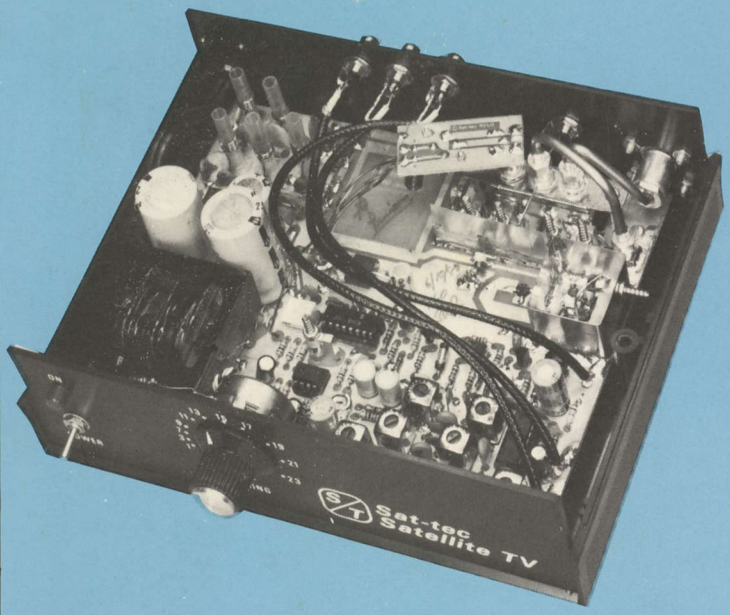

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